School of Public Health

Impact of Bilateral Cataract Surgery on Quality of Life, Depression, Falls and Injuries: A Prospective Study in Vietnam

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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature

To Gia Kien
Date: 01st July 2014

ABSTRACT

INTRODUCTION

Age-related cataract, which is a serious eye disease, is a global public health problem[1]. By age 70 almost everyone will have developed some degree of cataract[2]. Additionally, approximately 87% of the world's visually impaired people live in developing countries[3]. Fortunately, cataract surgery is a highly successful treatment and the most commonly performed ophthalmic procedure in many developed and developing countries[4].

Cataract has been found to be a major risk factor for falls in the older population who are already at an increased risk of injury[5]. Falls, constitute the single major reason for older people presenting to emergency departments and being hospitalised, and are also the leading causes of morbidity and mortality in that age group[6]. Research has also found that among an older population, falls can lead to psychological trauma, loss of independence, depression, anxiety, reduced mobility and quality of life. However the results relating to the impact of cataract surgery on falls are inconsistent with minimal research undertaken in developing countries, including Vietnam. There is also minimal information about the impact of cataract surgery on other injuries, vision-related quality of life and depression.

AIM

To investigate the impact of cataract surgery on vision-related quality of life, depression, falls and other injuries among an older Vietnamese population aged 50 years and over with bilateral cataract.

RESEARCH QUESTIONS

1. Is there a change in vision-related quality of life and depressive symptoms before and after bilateral cataract surgery?
2. Is there a change in the number of falls and other injuries before and after bilateral cataract surgery?

SPECIFIC OBJECTIVES

1. To determine the test-retest repeatability of the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25) for use with older Vietnamese adults with bilateral cataract.
2. To determine the prevalence of falls in the twelve months prior to cataract surgery and to examine the association between visual and other risk factors and falls among older bilateral cataract patients in Ho Chi Minh City, Vietnam.
3. To determine the impact of cataract surgery on vision-related quality of life and examine the association between objective visual measures and change in vision-related quality of life after surgery among bilateral cataract patients in Ho Chi Minh City, Vietnam.
4. To determine the impact of cataract surgery on depressive symptoms and examine the association between objective visual measures and change in depressive symptoms after surgery among a Vietnamese population in Ho Chi Minh City, Vietnam.
5. To determine the impact of first and both eye cataract surgery on the number of falls and other injuries among bilateral cataract patients in Ho Chi Minh City, Vietnam.
6. To develop recommendations based on the study's findings to improve the quality of life and reduce the number of falls and other injuries in older Vietnamese people with bilateral cataract.

METHODS

A longitudinal prospective cohort study of older adults with bilateral cataract awaiting first-eye cataract surgery was conducted between July 2011 to July 2013 at the Eye Hospital in Ho Chi Minh City, Vietnam. Inclusive criteria for participants were living independently in the community and aged 50 years or older. Exclusive criteria were previous cataract surgery, injury or diabetes-related cataract, a diagnosis of glaucoma or any other significant ocular conditions, a diagnosis of dementia, Parkinson's disease, schizophrenia or being wheelchair bound.

Patients were consecutively approached by the researcher after screening their medical books for eligibility and consultation with ophthalmologists from the Eye hospital. Eligible subjects were provided with information about the study including its purpose, their involvement in the study, and confidentiality of information provided. Written consent was obtained by the researcher before any data was collected.

A researcher-administrated questionnaire was administered at three time points: one week before first eye cataract surgery, one to three months after their first or second-eye cataract surgery and one year after their first or second eye cataract surgery. The third interview was conducted by telephone. Demographic information was collected as well as current prescribed medications, refractive management, presence of co-morbidities, falls and other injuries such as a burn, contusion, or laceration. A fall was defined as *"an event which results in a person coming to rest inadvertently on the ground or floor or other lower level"*.

Information related to vision-related quality of life was assessed using the National Eye Institute Visual Function Questionnaire 25-item (NEI VFQ-25). Depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D). The questionnaires were translated into

Vietnamese and then back to English by two independent translators. A pilot study of 30 bilateral cataract patients was conducted to test the reliability, length and appropriateness of the questionnaire. The pilot study suggested that some modifications were needed to reflect the culture and behaviour of the Vietnamese population.

Three objective visual measures were also collected at baseline and one to three months after first or second-eye cataract surgery. These tests included visual acuity, sensitivity and stereopsis. Visual acuity was measured using Snellen's Chart. Contrast sensitivity was measured using Pelli-Robson chart and stereopsis was measured using the Titmus Fly Stereotest.

Descriptive and inferential statistics was performed to describe the sample and examine differences/changes over the study period. The outcome of interest was the number of falls and injuries. Secondary outcomes were vision-related quality of life and depression.

Logistic regression analysis was undertaken to determine risk factors for a fall in the previous year before first-eye cataract surgery after adjusting for potential confounders. A multilevel Poisson regression model was undertaken to assess the change in the number of falls before, between and after first or second-eye cataract surgery. Two separate Generalised Linear Models were undertaken to assess changes in vision-related quality of life and depressive scores before and after first or second-eye cataract surgery.

RESULTS

A total of 434 bilateral cataract patients were approached by the researcher, of whom eleven patients refused to participate and ten were ineligible. The sample at the baseline was 413 patients. A total of 247 patients completed the second assessment one to three months after first or second-eye cataract

surgery; and 312 completed the third assessment a year after first or second-eye cataract surgery.

Falls and injuries

The prevalence of falls in the previous twelve months for the cohort of bilateral cataract patients was 13%. When examining risk factors for a fall in the previous year before first-eye cataract surgery for the worse eye, women (OR=4.64, 95%CI: 1.85–11.66) and those who lived alone (OR=4.51, 95%CI: 1.44–14.14) were at increased risk of a fall after adjusting for potential confounders. Those who reported co-morbidity were at decreased risk of a fall (OR=0.43, 95%CI: 0.19–0.95). Contrast sensitivity (OR=0.31, 95%CI: 0.10–0.95) was the only significant visual test associated with a fall. These results were similar for the better eye, except the presence of a co-morbidity was not significant (OR 0.45, 95% CI 0.20–1.02). Again, contrast sensitivity was the only significant visual factor associated with a fall (OR=0.15, 95%CI: 0.04–0.53).

The results of the prospective longitudinal assessments measured at three-time points found that the risk of falls decreased by 78% (IRR=0.22, 95%CI: 0.06-0.77, p=0.018) in the year after cataract surgery for participants who had first-eye surgery only and 83% (IRR=0.17, 95%CI: 0.04-0.69, p=0.012) for participants who had both eyes operated on. The risk of falls was three times higher for females than males (IRR=3.13, 95%CI: 1.53-6.40, p=0.002). Improved binocular contrast sensitivity was also associated with a decrease in falls (IRR=0.40, 95%CI: 0.17-0.97, p=0.042). The prevalence of other injuries was 5.6% before surgery which decreased to 3.4% for participants who had first-eye surgery only and 4.7% for participants who had both eyes operated on. However, the number of injuries in the cohort was too small to undertake multivariate modelling.

Vision-related quality of life

Vision-related quality of life scores significantly improved by 15 points after first or second-eye cataract surgery ($p<0.01$) compared to before first-eye cataract surgery. An additional increase of four points in vision-related quality of life score was observed in those that had both-eye cataract surgery compared to those that had first-eye cataract surgery only ($p<0.01$). A one log unit increase in binocular contrast sensitivity (better vision) significantly improved vision-related quality of life scores by 13 points ($p<0.01$). A one log unit improvement in binocular stereopsis significantly improved vision-related quality of life score ($p<0.01$) by 3 points.

Depression

The results of the before and after study found a significant improvement in the depressive symptom scores ($p=0.04$) after first or second-eye cataract surgery. In addition, females reported a significantly greater improvement in depressive symptom scores compared to males ($p=0.01$). However, visual acuity, contrast sensitivity, and stereopsis were not significantly associated with change in depressive symptoms scores.

CONCLUSIONS

The findings found that first and second-eyes cataract surgery significantly reduced the number of falls and other injuries and improved vision-related quality of life and depression in a Vietnamese population. These findings have implications for Ophthalmologists and other health professionals as they highlight the importance of cataract surgery for reducing the risk of falls and other injuries and improving other health outcomes. The contrast sensitivity measure may also allow health professionals to identify patients who would most benefit from second-eye cataract surgery and other injury prevention interventions.

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LIST OF PUBLICATIONS

To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. **Australasian Journal on Ageing**. 2014; 33(2):E7-E10. [IF: 0.94]

To KG, Meuleners LB, Fraser ML, Do DV, Duong DV, Huynh V-AN, To QG, Phi TD, Tran HH, Nguyen ND. Prevalence and Visual Risk Factors for Falls in Bilateral Cataract Patients in Ho Chi Minh City, Vietnam. **Ophthalmic Epidemiology**. 2014; 21(2):79-85. [IF: 2.18]

To KG, Meuleners LB, Fraser ML, Do DV, Duong DV, Huynh VA, To QG, Phi TD, Tran HH, Nguyen ND. The impact of cataract surgery on vision-related quality of life for bilateral cataract patients in Ho Chi Minh City, Vietnam: a prospective study. **Health and Quality of Life Outcomes**. 2014; 12(1):16. [IF: 2.27]

To KG, Meuleners LB, Fraser ML, Van Duong D, Van Do D, Huynh VA, Phi TD, Tran HH, Nguyen ND. The impact of cataract surgery on depressive symptoms for bilateral cataract patients in Ho Chi Minh City, Vietnam. **International Psychogeriatrics**. 2014; 26(2):307-13. [IF: 2.19]

To KG, Meuleners L, Bulsara M, Fraser ML, Duong DV, Do DV, Huynh VA, Phi TD, Tran HH, Nguyen ND. A longitudinal cohort study of the impact of first and both-eye cataract surgery on falls and other injuries in Vietnam. **Clinical Interventions in Aging.** 2014; 9:743-51. [IF: 2.65]

ABBREVIATIONS

ADVS	Activities of Daily Vision Scale
BDI	Beck Depression Inventory
CES-D	Center for Epidemiology Studies – Depression Scale
CI	Confident Interval
COPD	Chronic Obstructive Pulmonary Diseases
CSS	Cataract Symptom Scale
DASS	Depression Anxiety Stress Scale
ECCE	Extra-Capsular Cataract Extraction
EQ-5D	European Quality of Life questionnaire – 5 domains
ETDRS	Early Treatment of Diabetic Retinopathy Study
GDS	Geriatric Depression Scale
GEE	Generalised Estimating Equation
GHQ	General Health Questionnaire
HADS	Hospital Anxiety and Depression Scale
HRQOL	Health-related Quality of Life
ICCE	Intra-Capsular Cataract Extraction
IND-VFQ-33	33-item Indian Vision Functioning Questionnaire
LHS	London Handicap Scale
logMAR	Logarithm of the minimum angle of resolution
MMSE	Mini Mental State Examination
NEADL	Nottingham Extended Activities of Daily Living Scale
NEI VFQ-25	25-item National Eye Institute Visual Function Questionnaire
NHVOL	The Nursing Home Vision-Targeted Health-related Quality of Life Questionnaire
NSAID	Non-Steroid Anti-Inflammatory Drugs
OR	Odd Ratio
PIADS	Psychosocial Impact of Assistive Devices Questionnaire
POMS	Profile of Mood States
RCT	Randomized Controlled Trial
RR	Relative Risk
SD	Standard Deviation
SE	Standard Error

SF-12	12-item Short Form Health Survey
SF-36	36-item Short Form Health Survey
SIP	Sickness Impact Profile
UK	The United Kingdom
USA	The United States of America
VDA	Visual Disability Assessment
VF-14	14-item Visual Function Index
VF-11	11-item Visual Function Index
VF-9	9-item Visual Function Index
VRQOL	Vision-related Quality of Life
WHO	World Health Organization
WHO-VF-20	World Health Organization – Prevention of Blindness and Deafness – 20-item Visual Functioning Questionnaire
WHO-QOL-12	World Health Organization – 12-item Quality of Life Questionnaire

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CHAPTER 1: INTRODUCTION

1.1. Background

Age-related cataract, which is a serious eye disease, is a global public health problem[1]. By age 70 almost everyone will have developed some degree of cataract[2]. Additionally, approximately 87% of the world's visually impaired people live in developing countries[3]. Fortunately, cataract surgery is a highly successful treatment and the most commonly performed ophthalmic procedure in many developed and developing countries[4].

Cataract has been found to be a major risk factor for falls in the older population who are already at an increased risk of injury[5]. Falls, constitute the single major reason for older people presenting to emergency departments and being hospitalised, and are also the leading causes of morbidity and mortality in that age group[6]. Research has also found that among an older population, falls can lead to psychological trauma, loss of independence, depression, anxiety, reduced mobility and quality of life. However the results relating to the impact of cataract surgery on falls are inconsistent with minimal research undertaken in developing countries, including Vietnam. There is also minimal information about the impact of cataract surgery on other injuries, vision-related quality of life and depression.

1.1.1. Visual changes following cataract surgery

First-eye cataract surgery has been shown to bring about significant improvements in visual acuity (sharpness of vision), contrast sensitivity (ability to differentiate between object and background) and stereopsis (a form of depth perception)[7-9]. However, bilateral cataract patients frequently report vision-related problems while waiting for second-eye surgery, most likely due to differences in vision between the operated and un-operated eyes[7, 9-11]. When this difference is large, it has a negative effect on stereopsis[9]. Second-eye

surgery largely corrects this issue and can bring about large improvements in stereopsis[7, 10].

1.1.2. Cataracts, falls and other injuries

Cataract has been found to be a major risk factor for falls in the older population who are already at an increased risk of injury[5]. Falls, constitute the single major reason for older people presenting to emergency departments and being hospitalised, and are also the leading causes of morbidity and mortality in that age group[6]. This group experiences falls frequently, with a third of those aged 65 years or older falling at least once a year[12], and the incidence of repeat falls being 5.5 per 100 persons per year[13]. Research has also found that among an older population, falls can lead to psychological trauma, loss of independence, depression, anxiety, reduced mobility and social isolation[14, 15].

There is inconsistent information on the impact of cataract surgery on falls. In a case-control study, the risk of experiencing a fall before cataract surgery was higher than the risk recorded in a control group[16]. A study by Brannan et al.[17] also noted a significant reduction in the risk of falls after cataract surgery. Another study, of females only, found that the frequency of falls decreased by 34% after first-eye surgery[14]. However, almost all studies were from developed countries.

There is also limited information of the association between cataract surgery and other injuries in Vietnam. One study by Coster et al.[16] found cataract patients have a higher risk of injuries such as burns, contusions, or lacerations compared with controls investigated before surgery, but following surgery their risk decreased to the same level as that of controls.

1.1.3. Cataract and vision-related quality of life (VRQOL)

Quality of life is a relevant outcome of cataract surgery as research has shown that an older person's quality of life is associated with freedom, activity, independence and control[18, 19]. The concept of VRQOL is similar to the concept of general quality of life but incorporates questions specifically related to issues such as daily life activities for a population with visual impairment. Research to date indicates that first-eye cataract surgery results in significant improvements in both physical and psycho-social quality of life scores[8, 20]. One study by Elliott et al. even reported the improvements in VRQOL following first-eye surgery are larger than those following second-eye surgery[20], and those still waiting for second-eye surgery[10]. However, little is known about the impact of cataract surgery on VRQOL in Vietnam.

1.1.4. Cataract and depression

Depression is a major health issue for Vietnamese adults aged 55 and over, affecting 17%–47% of this age group[21, 22]. Previous research indicated that vision impairment among older adults can impact on both physical functioning and psychological well-being[23]. However, the impact of cataract surgery on depression in both developed and developing countries remains unclear. A study by Harwood et al. in the United Kingdom reported a small improvement in depressive symptoms after first-eye cataract surgery[14]. In addition, a recent Australian population-based study found a significant decrease of 18% in the number of mental health contacts (mental healthcare received in ambulatory (community and outpatient), inpatient and residential mental health settings) for depression or anxiety in the first year after cataract surgery[24]. However, several other studies have found no significant change in depressive symptoms after first or second-eye cataract surgery[25-28]. To date, very few studies have examined the association between visual measures and change in depression after cataract surgery in both developed and developing countries.

1.2. The study location - Vietnam

Vietnam is located in South-East Asia between the longitudes 102^{o} and 110^{o} East, and the latitudes 8^{o} and 24^{o} North, sharing the borderline with China in the north, Lao and Cambodia in the west, and the East Ocean in the east and the south. The S-shaped country is 1,650 km long from the north to the south, and 50 kilometres wide west to east as its narrowest point, giving the country a total area of 331,690 square kilometres. The country has 62 provinces, with its political capital located at Hanoi City[29]. It is a developing country with a per capita Gross Domestic Product of 1,755 US dollars[30]. Ranked 13th among the most populated nations of the world, Vietnam has a population of 86 million people of which 17% are aged 50 years or older and 50.5% are female[31]. The dominant ethnic group is the Kinh people (87%) and the remaining population consists of 54 ethnic minorities[29].

1.3. Statement of the problem

Previous research on the benefits of first and second-eye cataract surgery have been limited by inconsistent methodologies which include small sample sizes, recall biases, and self-report measures[32, 33]. Also, the vast majority of these studies did not define whether participants had undergone cataract surgery on one or both eyes[32, 34-39]. Here a gap exists in the literature regarding the specific effects of first and second-eye cataract surgery on health related outcomes such as falls and other injuries, VRQOL and depression for bilateral cataract patients. To date, there also have been limited studies that have included objective measures of visual function when examining the impact of cataract surgery on health outcome measures. Accurate assessment of the effectiveness of cataract surgery is essential to provide evidence based guidelines on the timeliness for access to cataract surgery; to reduce the financial burden on the health care system; and to provide information for patients as they wait for cataract surgery.

Currently, limited information exists on the effects of bilateral cataract surgery in relation to falls and other injuries, VRQOL, and depression for an older Vietnamese population. Given the ageing population of Vietnam, issues related to the safety of this group are paramount. The increasing prevalence of cataract and the potential to cause severe visual disability means that a firm understanding of its impact is important. It is anticipated that the results of this study will provide high quality information that will increase the knowledge-base and contribute to improvements in the provision of vision-related services, education programs, and improved health outcomes for the older population in Vietnam.

1.4. Study objectives and research questions

The study aims to investigate the impact of cataract surgery on falls and other injuries, VRQOL and depression among an older Vietnamese population aged 50 years and over with bilateral cataract. Research questions and specific objectives are:

1.4.1. Research questions

1. Is there a change in vision-related quality of life and depressive symptoms before and after bilateral cataract surgery?
2. Is there a change in the number of falls and other injuries before and after bilateral cataract surgery?

1.4.2. Specific objectives

1. To determine the test-retest repeatability of the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25) for use with older Vietnamese adults with bilateral cataract.
2. To determine the prevalence of falls in the twelve months prior to cataract surgery and to examine the association between visual and other risk

factors and falls among older bilateral cataract patients in Ho Chi Minh City, Vietnam.

3. To determine the impact of cataract surgery on vision-related quality of life and examine the association between objective visual measures and change in vision-related quality of life after surgery among bilateral cataract patients in Ho Chi Minh City, Vietnam.
4. To determine the impact of cataract surgery on depressive symptoms and examine the association between objective visual measures and change in depressive symptoms after surgery among a Vietnamese population in Ho Chi Minh City, Vietnam.
5. To determine the impact of first and both-eyes cataract surgery on the number of falls and other injuries among bilateral cataract patients in Ho Chi Minh City, Vietnam.
6. To develop recommendations based on the study's findings to improve the quality of life and reduce the number of falls and other injuries in older Vietnamese people with bilateral cataract.

1.5. Significance of the study

This study is the first longitudinal study to measure the impact of bilateral cataract surgery on the number of falls and other injuries, VRQOL, and depression in Vietnam. It is also the first study to use three objective measures of visual functioning. Findings from this prospective longitudinal cohort study will provide ophthalmologists important information that may impact on ophthalmological practices in terms of information and advice given to bilateral cataract patients. The information gained from this study will allow these professionals to advise patients about specific difficulties they may face or particular situations to avoid. Future long-term benefits may include a reduction in the number of injuries attributable to falls as well as other causes, and improved physical and mental health outcomes, consequently reducing the burden on the Vietnamese health care system.

1.6. Outline of the thesis

The breakdown of the thesis is as followings:

Chapter 1 introduces the major problems pertaining to an older population with bilateral cataract in developed countries, and in Vietnam. The chapter also stated the objectives and significance of the study.

Chapter 2 reviews the literature pertaining to epidemiology of cataract, cataract surgery, the impact of cataract and cataract surgery on falls and other injuries, VRQOL, and depression.

Chapter 3 presents the study methods including study site, sampling and sample size, data collection, research instruments, data analysis and ethical issues.

Chapter 4 presents the findings of the first paper which assessed the test-retest repeatability of the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25) for use with older Vietnamese adults with bilateral cataract.

Chapter 5 presents the findings of the second paper which assessed the prevalence of falls in the twelve months prior to cataract surgery and examined the association between visual and other risk factors and falls among older bilateral cataract patients in Ho Chi Minh City, Vietnam.

Chapter 6 presents the findings of the third paper which assessed the impact of cataract surgery on VRQOL and examined the association between objective visual measures and change in VRQOL after surgery among bilateral cataract patients in Ho Chi Minh City, Vietnam.

Chapter 7 presents the findings of the fourth paper which assessed the impact of cataract surgery on depressive symptoms and examined the association between objective visual measures and change in depressive symptoms after surgery among a Vietnamese population in Ho Chi Minh City, Vietnam.

Chapter 8 presents the findings of the fifth paper which assessed the impact of first and both-eyes cataract surgery on the number of falls and other injuries among bilateral cataract patients in Ho Chi Minh City, Vietnam.

Chapter 9 presents the discussion, conclusion and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

This chapter provides a background to the study and reviews the literature on the effects of cataract surgery and its impact on falls and other injuries, VRQOL, and depressive symptoms. Information on the prevalence and incidence of cataract is also discussed. In addition, evidence on the association between objective measures of vision and falls and other injuries, VRQOL and depressive symptom outcomes is reviewed.

2.1. Age-related cataract

2.1.1. Age-related cataract and its pathology

The term cataract refers to a clouding of the eye's crystalline lens that seriously impairs vision. Cataract is classified into congenital, age-related, injury-related, and disease-related cataract. Age-related cataract is the most common type and develops as a result of normal human biological aging[2, 40, 41]. Only age-related cataract will be discussed throughout this study. Age-related cataract is classified under three main types: nuclear, cortical and posterior sub-capsular cataract[42].

- Nuclear cataract occurs due to the excessive sclerosis and yellowing of the lens nucleus. The cataract normally progresses slowly; typically, nuclear cataract patients may become myopic but their reading vision may improve in the early stages of the cataract. The nucleus becomes very cloudy and sometimes brown, forming a brown nuclear cataract. At this stage, patients will probably have difficulty seeing in the dark[42].
- Cortical cataract begins with white or cerulean cloudy spots developing in the peripheral eye lens cortex. These spots then slowly spread over the lens nucleus and obstruct the sunlight

entering the nucleus. Both short and distant vision will be seriously affected[42].

- Posterior sub-capsular cataract begins with a small cloudy patch on the rear surface of the lens capsule, which is located on the pathway along which sunlight travels to the eye's retina. This type of cataract can develop rapidly to affect reading vision more than distance vision, and impair vision in strong sunlight, and produce a glaring effect[42].

2.1.2. Prevalence of cataract

The estimated number of visually impaired people worldwide is 285 million, with cataract accounting for 33%[43]. The prevalence of cataract is expected to increase rapidly in the future due to an increase in the aging population[44]. The prevalence of cataract varies with a higher number of cases seen in developing countries as compared to developed countries. The variation in cataract prevalence may be due to differences in cataract surgery rates, culture, lifestyle and behaviour[44-54], race and ethnicity[44, 51, 54-56], and latitude[44, 50, 56-58].

In the United States, for example, the prevalence of cataract is estimated at 17.2%[44]. In the Australian population, it is estimated at 14%[2]. A literature review covering 29 studies revealed that the crude prevalence of cataract in Europe is 19.3%, ranging from 6% to 25.2%, with the highest prevalence found in Germany and Italy[48]. Cataract is more common in Asia, Africa and South America and occurs there at a younger age compared to the experience in Western Europe, North America and Australia[57, 59]. In India, the prevalence of un-operated cataract is over 50%[59], while in China it is 21%[60].

2.1.3. Incidence of cataract

Data on the prevalence of age-related cataract are available worldwide; however, data on the incidence of age-related cataract are rarely reported.

Data from the well-known Blue Mountains Eye Study revealed that the incidence of cataract was 29.1% and 53.7% within five and 10-year study periods, respectively[61]. In the Beaver Dam Eye Study, the incidence of one-eye age-related cataract was 22.4% and 35.3% within five and 10 years, respectively[62]. The incidence of cataract was reported at 48.3% within nine years in the Barbados Eye Studies[63].

2.1.4. Cataract in Vietnam

In Vietnam there is almost no formally published data on the prevalence and incidence of cataract; however, data from Vietnam Vision Project reported that the incidence and the surgical rates of cataract were at 170,000 cases and 120,000 operations each year in the country, respectively[64]. As a result, approximately one million cataract cases are waiting for surgery in the country[65]. Another source recorded that cataract accounts for 65% of cases of blindness in Vietnam[64-68] which is higher than worldwide rates[41].

2.1.5. Treatment for cataract

Surgery is an effective and efficient treatment for cataract. Cataract operations are the most frequently performed ophthalmic procedure in many countries around the world[69-72]. There are three basic surgical techniques available worldwide, including intra-capsular cataract extraction (ICCE), extra-capsular cataract extraction (ECCE) and phaco-emulsification.

- ICCE is the surgical method in which surgeon opens a large incision to remove the entire lens and capsule, then an artificial intra-ocular lens is inserted in front of the iris.
- ECCE opens a smaller incision for removal of the nucleus, cortex and anterior capsule, except the posterior capsule is retained; the artificial intra-ocular lens is then inserted behind the iris.
- Phaco-emulsification is an upgraded version of ECCE. In this procedure, the opaque lens is emulsified into very small pieces by

using an ultrasonic handpiece together with aspiration to suck out the fragments, through a smaller incision. This technique does not damage the anterior chamber.

Phaco-emulsification is the fastest, safest, most effective and efficient procedure in terms of rapid visual recovery and a shorter hospital stay. However, this modern technique relies heavily on high-technology equipment, skilled surgical teams, and maintenance works that can greatly increase surgical costs. Despite this, phaco-emulsification has become the standard surgical procedure and dominates the other options[70-72]. In Vietnam, the technique has become the standard treatment for cataract and the most performed ophthalmic procedure[65]. Despite Vietnam's capacity to treat cataract using phaco-emulsification, with high success rates, cataract remains a leading cause of blindness and significantly contributes to the large number of people living with vision impairment in the country[64-68]. The high prevalence of people living with cataract-related visual impairment in Vietnam can be explained by the fact that cataract surgery rate was lower compared to the cataract incidence rate and there have been lack of resources including qualified surgeons and surgical equipment[64-68].

2.2. Cataract surgery and objective visual outcomes

2.2.1. The impact of cataract surgery on visual acuity

Visual acuity is the capacity to see and differentiate objects, and refers to the clarity of vision. The Snellen chart is the tool most commonly used by ophthalmologists for measuring visual acuity. The chart features a series of letters, with the smallest letters at the bottom.

Decreased visual acuity is associated with the increased severity of cataract. Visual acuity in patients accepted for cataract surgery is poorer than in those refused cataract surgery. Poor visual acuity negatively affects the performance of daily activities among cataract patients[73-77]. Almost all existing studies have

included visual acuity as a measure of visual improvement after cataract surgery[7, 14, 20, 25, 26, 28, 34, 74, 77-91]. This shows that visual acuity is the objective measurement most often applied by researchers when assessing visual impairment. All of these papers showed a significant improvement in visual acuity after cataract surgery[7, 14, 20, 25, 26, 28, 34, 74, 77-91]. Therefore, there seems little doubt that cataract surgery improves visual acuity in the operated eye.

Visual acuity is the traditional and most common measure used to assess visual impairment. As cataract can negatively impact on various aspects of vision, examining only visual acuity may not capture the full extent of impairment[92, 93].

2.2.2. The impact of cataract surgery on contrast sensitivity

Contrast sensitivity is the capacity to differentiate objects from their background and differentiate between dark and light. Like visual acuity, contrast sensitivity is an important measure of vision loss, especially in low-light conditions[73, 94]. Studies have shown that poor visual acuity and contrast sensitivity were independently associated with the increased severity of cataract[73, 76, 95]. Poor contrast sensitivity has been observed in all types of cataract[73, 76]. It has also been reported that some cataract patients who have good visual acuity still have poor contrast sensitivity[73, 76, 92, 95, 96].

The Pelli-Robson chart is the most commonly used test of contrast sensitivity. The chart features eight lines with six letters on each line. All the letters are the same size but they get fainter from left to right and from the top to the bottom, with the darkest letters on the top left.

Approximately half of the published papers examining the impact of cataract surgery on health outcomes such as falls and injuries, quality of life and depression, used contrast sensitivity as a measure of visual impairment[7, 14, 20, 28, 74, 77, 89-91]. Evidence exists that the contrast sensitivity measure may identify

cataract patients experiencing significant visual impairment, when the visual acuity measure may not[73, 76, 77, 95-97].

Evidence agrees that cataract surgery improves contrast sensitivity in the operated eye[7, 14, 20, 27, 28, 74, 89-91]. One study by Castells et al. showed that compared to first-eye cataract surgery, both-eye cataract surgery did not provide additional improvement for bilateral contrast sensitivity[7]; however, contrast sensitivity did improve after first and both-eye cataract surgery compared to before any surgery[7].

2.2.3. The impact of cataract surgery on stereopsis

Stereopsis refers to the visual perception of depth and capacity to see three-dimensionally. In cataract patients, stereopsis is significantly associated with visual acuity, contrast sensitivity and different vision between the two eyes. Therefore, stereopsis decreases with a reduction of visual acuity or contrast sensitivity, and with greater differences in vision between two eyes[98].

Stereopsis is often measured by stereo-fly tests. Approximately one fifth of studies examining the impact of cataract surgery on health outcomes such as falls and injuries, quality of life and depression, used stereopsis[7, 14, 20, 28, 89] to assess binocular visual impairment. All of these studies suggest that stereopsis improves significantly after cataract surgery[7, 14, 20, 28, 89].

2.3. Cataract surgery and falls

2.3.1. Falls in the older population

The World Health Organisation has defined a fall as *"an event which results in a person coming to rest inadvertently on the ground or floor or other lower level"*[99]. Among the older population falls are a common health issue, with 50% of those over 70 experiencing at least one fall each year[12, 100]. Half of those who experience a fall will fall a second time within the year[12, 100]. Fall-

related injuries occur in 50% of falls, while the incidence of falls increases over time and with increasing age[12, 101]. Medical attention is required in 20% of falls[100]. About 5% of fall-related injuries are severe enough to involve life-threatening fractures[12]. Every year, 424,000 fall-related deaths are reported worldwide[99]. Fatal falls occur more frequently in people over 65 years of age[99]. WHO has named falls as the second leading cause of accidental or unintentional injury-related death in the world[99].

2.3.2. Consequence of falls

Falls can cause loss of independence, depression, anxiety, reduced mobility and social isolation for the older population[14, 15] which results in lower quality of life[102, 103]. One study has reported that quality of life is even lower in recurrent fallers[102, 103]. Moreover, falls seriously increase economic burden for individuals and their families[104]. A previous study has reported that about 30% of fallers will develop a fear of falling[105] which increases the risk of falls[106]. Fear of falling also negatively affects health status and decreases quality of life[103, 106]. One study has reported that injuries such as fracture, bruises, cuts or sprains occur in 27% of fallers in people aged 45 years and over[16]. In the older population aged 65 years and over, about 5% of falls results in fracture[12] . One of the most serious fractures is the hip fracture which occurs in 1% of fallers[12]. Those who experience a hip fracture are 6 times more likely to die than those who do not; and those who survive often do not recover to their previous level of functioning[107].

2.3.3. Risk factors for falls

It is widely accepted that falls are caused by complex combinations of various factors[12, 108-110]. Yu et al. classified these risk factors into eight categories including demographic and socio-economic status, physical status, behaviour and psychological status, function, morbidity, and environment[111]. Alternatively, Masud and Morris or Oakley et al. classified risk factors into

five major categories including nutrition, environment, prescribed medications, lack of physical activities and age-related changes[12, 108]. Another classification is that age, gender and race, gait and balance, lower extremity strength, vertigo and dizziness, vision, cognition, cardio-vascular disease, medications, depression and environment[109]. Intrinsic and extrinsic factors can also be used to classify risk factors for falls[12, 109, 111].

The most common risk factors for falls are age and gender. Age has been found to be associated with the risk of falls in previous research[12, 110-112]. Falls are the most common cause of injury in those who are less than 15 and over 60 years of age[112]. In the older population, the risk of falls is positively associated with an increasing age[110, 111]. The association between increased risk of falls and age is attributable to a combination of aging-related factors[113]. Such factors include visual impairment[109, 110, 114-118], hearing impairment[110], physical and psychological degeneration, arthritis, diabetes and cardiovascular disease[109]. Gender is another well-known risk factor for falls. In the older population aged over 60, women are more likely to fall compared to men[109-111]. However, it has been reported that the risk of falls in men aged over 85 is higher than that of women in this age group[113].

In addition to age and gender, other factors such as previous history of falls, fear of falling, use of walking aids, dizziness, gait problems, various medical conditions and medication usage, and living alone have been found to be associated with increased risk of falls. These findings came from a meta-analysis of studies from developed countries examining risk factors for falls among the general older population[110].

2.3.4. Visual risk factors for falls

Visual impairment due to cataract is a major risk factor for falls among the older population, who are already at an increased risk of injury[5, 110, 118, 119]. Visual impairment comprises defects in different areas of vision such as visual

acuity, contrast sensitivity and depth perception. A number of studies have examined the relationship between visual impairment and falls risk in the general older population, with conflicting results[117, 120]. Several studies reported that poor visual acuity increased the risk of falls[116, 121-124]. However, recent research has found that reduced contrast sensitivity and depth perception may be more important visual risk factors for falls[115, 116, 119, 120, 125].

Contrast sensitivity frequently decreases as a result of cataract[74] and may be an important visual risk factor for falls among cataract patients because it is required for detecting and discriminating objects in the environment, for using stairs and is particularly important for activities performed in dim light[94, 126, 127].

One study, examining visual risk factors for falls, randomly selected 156 community-dwelling Australians aged 63 to 90 years old in Sydney. It was reported that those who had good or moderate vision in one eye and poor vision in the other eye suffered the highest risk of falls[119]. This conclusion is supported by a systematic review with 10 studies included[128]. The review was conducted to assess the impact of second-eye cataract surgery on health outcomes such as visual function, quality of life, falls and driving ability in the older population. Therefore, differences in vision between two eyes may be an important risk factor for falls among cataract patients. Different vision between the two eyes usually results in very poor stereopsis[98]. A previous study has reported that a reduction in stereopsis was associated with an increase in differences between the two eyes in visual acuity, contrast sensitivity and refractive error[98].

2.3.5. The impact of cataract surgery on falls

Only five studies have specifically examined the impact of cataract surgery on the risk of falls and have provided conflicting results. These studies are summarised in Table 1 (page 20).

The strongest evidence for cataract surgery and falls prevention comes from a UK-based RCT[14]. It included 142 women aged over 70 years who had expedited first-eye cataract surgery and 131 on the waiting list and reported a 34% reduction in falls rate and a 40% reduction in risk of recurrent falls after first-eye surgery[14]. A subsequent RCT by the same authors included 115 women aged over 70 who received second-eye cataract surgery and 103 on the waiting list. This study concluded that second-eye surgery did not reduce the risk of falls[28].

For both RCTs, falls were recorded prospectively in falls diaries with follow-up conducted every three months. Both RCTs used visual acuity, contrast sensitivity and stereopsis measures to assess participants' visual impairment. Weaknesses of these studies included small sample sizes and inclusion of only women aged over 70 years in the samples.

Another UK-based prospective study evaluated the impact of cataract surgery on the risk of falls and reported a significant reduction in the number of fallers in the post-surgery period ($n=6$, $p<0.001$)[17]. Eighty-four cataract patients aged 65 years and older were followed for six months before and six months after cataract surgery, recorded falls in falls diaries and were followed up every two months[17]. The study used only visual acuity to measure visual impairment[17]. A weakness of this study is that it was not specified whether participants underwent first, second or both-eye cataract surgery; and all participants were combined in the analysis. In addition, the sample size was small with a short (six month) follow-up period, resulting in a small number of total falls reported.

In contrast, a USA-based cohort study concluded that cataract surgery did not reduce the risk of falls among unilateral and bilateral cataract patients aged 55 years and older[91]. The study included 122 cataract patients who underwent first or both-eye surgery during the study period and 92 who had no surgery.

Falls were recorded by asking the participants “Have you fallen in the past 12 months?” before and one year after their surgery. Visual acuity and contrast sensitivity were used to assess visual impairment in this study[91]. This study however, did not distinguish between first and both-eye cataract surgery.

Recently, a population based study from Western Australia examined the risk of falls two years before first eye cataract surgery, between first and second eye surgery and two years after second eye surgery[129]. Interestingly this study concluded that the risk of an injurious fall doubled after first eye surgery and there was a 34% increase in injurious falls after second eye surgery, compared to before first eye surgery. It should be noted that this study included only more severe falls that resulted in an injury requiring hospitalisation and did not include any measures of vision in the analysis[129].

No information exists on the impact of cataract surgery on falls in developing countries, such as Vietnam, where vision is often much poorer before surgery than in developed countries and there are different cultural and lifestyle factors (such as older people living with their adult children) that may affect fall risk[130].

Table 1: Studies examining the impact of cataract surgery on falls

Author/Country	Design/ Participants	Falls data	Visual measurements	Conclusions
Brannan et al., 2003, UK[17]	Prospective study of 84 cataract patients age 65 years and over	Falls diary	Visual acuity	Cataract surgery reduced the risk of falls
Foss et al., 2006, UK[28]	RCT of women aged over 70 years. 115 cases received second-eye cataract surgery and 103 controls were waiting for second-eye surgery	Falls diary	Visual acuity, contrast sensitivity, and stereopsis	Second-eye cataract surgery did not reduce the risk of falls
Harwood et al., 2005, UK[14]	RCT of women aged over 70 years. 142 cases received first-eye cataract surgery and 131 controls were waiting for first-eye surgery	Falls diary	Visual acuity, contrast sensitivity, and stereopsis	First-eye cataract surgery reduced the risk of falls and fractures

Author/Country	Design/ Participants	Falls data	Visual measurements	Conclusions
McGwin et al., 2006, USA[91]	Prospective cohort study of unilateral and bilateral cataract patients aged 55 years and over including 122 subjects who had cataract surgery, and 92 subjects who had no surgery	Questionnaire	Visual acuity and contrast sensitivity	Cataract surgery did not reduce the risk of falls
Meuleners et al., 2014, Australia[129]	Population-based study of 28,396 people age 60 years and over who had bilateral cataract surgery	Population-based hospital records	None	First-eye and second-eye cataract surgery both increased the risk of hospital admission from injury due to a fall, compared to before first eye cataract surgery

2.3.6. Falls in cataract patients in Vietnam

Despite the high prevalence of un-operated cataract in Vietnam, no study has investigated the prevalence of falls or examined visual and other risk factors for falls among Vietnamese cataract patients. A recent prospective cohort study of injury hospitalisations in Vietnam has found that falls and road accidents are the most prevalent injuries in the country and they account for the highest total economic costs[104]. In those aged over 60 years, falls are the leading cause of injury, reported at 32% in the sample population[112]. Research has found that among the older population, falls can lead to psychological trauma, loss of independence, depression, anxiety, reduced mobility and social isolation[14, 15]. In Vietnam, falls can also lead to severe personal economic burden for individuals and their families[104].

It should be noted that all existing studies examining the impact of cataract surgery on falls risk were conducted in developed countries. No study has examined visual risk factors for falls among cataract patients specifically and no study has been conducted in Vietnam, where cataract patients have much poorer vision before surgery than in developed countries[130]. Given the ageing population of Vietnam, issues related to the impact of cataract surgery and the safety of this group are paramount. A thorough understanding of the risk factors for falls and injuries among cataract patients is essential for the assessment and prioritisation of individuals for cataract surgery, and for the prevention of fall and injury cases in Vietnam.

2.4. Cataract surgery and injuries other than falls

2.4.1. Injuries other than falls in the older population

Injury is a major public health problem, particularly in the older population[100, 101]. Injuries, resulting from violence, traffic accidents, drowning, falls and poisonings, shorten the life expectancy of over 15,000 people daily in the world[131]. Traffic accidents are the leading cause of fatal injuries[132] which

account for 1.24 million deaths each year worldwide[133]. Older adults aged 65 years and over are at higher risk of injury compared to younger age groups[132]. Over 90% of deaths attributable to traffic accidents occur in developing countries[133]. While fatal injuries are responsible for approximately six million deaths each year in the world[131], this number represents only a small percentage of injury victims[131]. Many victims of injuries will suffer disability for the rest of their lives[131, 133]. According to the Vietnam National Injury Survey, there were approximately 35,000 deaths due to injuries in Vietnam in 2010 with falls the second leading cause of death among those aged 60 years and over[104, 134].

2.4.2. Visual risk factors for injuries

There is minimal information about the association between visual impairment and the risk of injury. One study from the USA, which used secondary data from 116,796 individuals in the National Health Interview Survey from 1986 to 1994, reported that severe visual acuity impairment increased the risk of unintentional injury mortality[135, 136].

2.4.3. Impact of cataract surgery on the risk of injuries

To date, only one study has assessed the impact of cataract surgery on the risk of injuries. A retrospective case-control study conducted in Canada examined whether adults aged 45 years and over who were waiting for first-eye cataract surgery were at increased risk of using health care services due to an injury, compared to controls. It included 3,811 cases and 11,359 controls and reported that before surgery, cataract patients had a significantly increased risk of injury compared to controls, but the risk of injury decreased to that of controls following surgery. Injuries included fractures, sprains, lacerations, contusions, and burns. It should be noted that cases experienced higher rates of co-morbidities including diabetes, stroke and dementia. Moreover, the study assessed only the impact of cataract surgery on the risk of injuries and

did not explore the impact of first or second-surgery separately as they were combined for analysis[16]. Further research, therefore, should be conducted to provide useful information of the impact of cataract surgery on the risk of injuries.

2.5. Cataract surgery and vision-related quality of life

2.5.1. What is quality of life?

Quality of life is a very complex concept, understood differently in different fields and by different individuals[137-141]. In general, quality of life is a concept that has been developed to assess living conditions and personal satisfaction with life[138]. In healthcare, quality of life has been defined as "*individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns*" by the World Health Organisation (WHO)[142]. Health-Related Quality of Life (HRQOL) was developed to measure people's health, which is "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*"[143]. HRQOL can be considered to comprise four fundamental domains within the term "well-being": the physical, functional, emotional and social domains[142, 144].

HRQOL can be assessed by using generic or disease-specific instruments. Generic HRQOL instruments have been developed to assess health status and quality of life in general populations with differing characteristics, health conditions and interventions. Conversely, disease-specific HRQOL instruments have been developed to assess health status and quality of life in specific populations with specific diseases or impairments. The specific instruments have high content validity and are able to sensitively reveal small variations in health outcomes, yielding results that are easily interpreted. Therefore, specific instruments are very well suited for use in clinical research[141, 145, 146].

2.5.2. Vision-related quality of life

Vision-Related Quality of Life (VRQOL) is a vision-specific HRQOL measure.[141, 146 129, 134] VRQOL instruments have been developed to assess health status and quality of life, specifically in visually impaired people. This is because generic HRQOL instruments are not responsive enough to examine the association between vision, health status and quality of life[141, 146]. A large number of instruments have been developed in questionnaire form to assess VRQOL. Table 2 below describes the questionnaires published since 2000 that have been developed for assessing VRQOL in visually impaired people, including cataract patients.

These questionnaires have advantages and disadvantages. For example, the Visual Function Index 14 (VF-14) and its newer versions have good psychometric properties and have been widely used for assessing VRQOL; however, the VF-14 has the disadvantage of ceiling effects and has been shown to suffer from poor targeting[147, 148]. Other questionnaires that have poor psychometric properties, ceiling effects, suboptimal targeting, or confined dimensional assessments are inadequate for assessing VRQOL in cataract patients[147]. A good questionnaire for assessing VRQOL should not be too specific or too general[145]. The 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25) has demonstrated good reliability and validity, and has been used for assessing the VRQOL of cataract patients in many countries around the world. Although it is not designed exclusively for cataract patients, the NEI VFQ-25 addresses the impact of visual impairment on daily activities as well as mental and social outcomes and is relevant for cataract patients[147, 149-160]. Therefore, NEI VFQ-25 appears to be a satisfactory instrument for assessing VRQOL in cataract patients.

Table 2: Description of questionnaires used for assessing VRQOL in visually impaired people and cataract patients

Questionnaire	Year	Target population	Items
BRSFOS[161]	2000	Visually impaired people	28
LVQOL[162, 163]	2000	Visually impaired people	25
NEI VFQ-25[150]	2001	Visually impaired people	26
IVI[164, 165]	2002	Visually impaired people	32
VisQoL[146]	2005	Visually impaired people	6
VCM1[166-168]	2008	Visually impaired people	10
VF-14, VF-11, VF-9[148, 169-171]	2009	Visually impaired people	9*
HVAT[172]	2000	Cataract patients	10
MIOLS VFQOL[173, 174]	2002	Cataract patients	14
ADVS[175, 176]	2003	Cataract patients	15
VSQ[177]	2003	Cataract patients	6/12**
QVQ[178]	2004	Cataract patients	17
TyPE[179, 180]	2009	Cataract patients	11
Catquest-9SF[80, 181-183]	2009	Cataract patients	9

**Modified from VF-14; **short/long form*

2.5.3. VRQOL in cataract patients

Evidence suggests that cataract patients have more difficulty performing daily activities, and more physical and mental problems than their normally-sighted counterparts. Several of studies examining HRQOL and VRQOL in cataract patients have been conducted in developing countries. First, a case-control study from Kenya including 196 cataract patients and 128 normally sighted controls aged 50+, used the World Health Organisation's Prevention of Blindness and Deafness Visual Function-20 (WHO/PBD VF-20) and the European Quality of life five descriptive domains (EQ-5D) to examine specific and generic health-related quality of life[184]. For specific health-related quality of life, mean scores on all subscales including general functioning, psychosocial, overall eyesight and pain/discomfort in eyes were poorer in

cataract patients compared to controls. Cataract patients also experienced lower generic health-related quality of life compared to controls. The findings also showed that poorer visual acuity was associated with lower vision-related quality of life[184].

Two further case-control studies using the same design and instruments (WHO/PBD VF-20 and EQ-5D) as above yielded the same conclusions. The first included 217 cases and 280 controls in Bangladesh[185]. The second included 238 cases and 163 controls in the Philippines[186].

A population-based survey including 5,119 adults aged 40 years and over in rural southern India reported that age-related cataract patients had difficulties across all subscales of quality of life (activities of daily living, mobility, social and mental subscales) as well as visual functioning (general vision, visual perception, peripheral vision, sensory adaptation, and depth perception). Again, cataract patients with poorer quality of life and visual function, which were measured by the Indian Visual Function and Quality of Life Questionnaire and developed by the Aravind et al. study, had poorer visual acuity[173, 187].

Another study conducted in Sri Lanka showed that cataract patients had lower scores on physical health components of the Medical Outcomes Study Short-Form 36 (SF-36), on all subscales of the NEI VFQ-25 and reduced physical functioning as measured by the Physical Disability Index[188].

One multicenter study included 439 un-operated cataract patients from 14 hospitals in Japan using the NEI VFQ-25 and 8-item Short-Form Health Survey (SF-8). This study recruited both unilateral and bilateral cataract patients who were not scheduled for cataract surgery. SF-8 is a measure to assess generic quality of life whereas NEI VFQ-25 is a measure to assess vision-related quality of life. The findings showed that a decline in visual

acuity was not significantly associated with a reduction in SF-8 scores. However, a decline in visual acuity was significantly associated with a reduction in NEI VFQ-25 scores. Moreover, the study acknowledged that cataract may affect daily activities as those who have more severe visual impairment may have more difficulty visiting hospitals and receiving treatment[189].

These studies consistently show that cataract patients have poorer VRQOL and generic HRQOL than their normally sighted counterparts. This suggests that visual impairment arising from cataract negatively impacts on general health, beyond vision-specific issues[186]. It is also noted that a dose-response pattern has been observed between more severe visual impairment and decreased VRQOL in cataract patients[184-188]. It is therefore expected that successful cataract surgery will result in an improvement in VRQOL.

2.5.4. Impact of cataract surgery on VRQOL

A total of 26 studies were located assessing the impact of cataract surgery on quality of life. Eleven studies used only VRQOL questionnaires[26, 27, 74, 77-81, 83, 89, 190], two studies used only generic HRQOL questionnaires[85, 86], and 13 studies used both VRQOL and generic HRQOL questionnaires[7, 14, 20, 28, 34, 82, 84, 87, 88, 90, 191-193]. Almost studies were conducted in developed countries[7, 14, 20, 26-28, 74, 77, 79-85, 87-90, 190, 191, 193], only four studies were conducted in developing countries[34, 78, 86, 192].

All of the 11 studies that used only VRQOL questionnaires[26, 27, 74, 77-81, 83, 89, 190], and two studies that used only generic HRQOL questionnaires[85, 86] showed a significant improvement in the quality of life mean score after cataract surgery. However, four of 13 studies that used both generic HRQOL and VRQOL questionnaires showed no improvement in generic HRQOL mean scores, but a significant improvement in the VRQOL mean scores, after cataract surgery[7, 28, 87, 90]. Moreover, one study even showed a significant

reduction in the generic HRQOL mean score, but a significant improvement in the VRQOL mean score, after cataract surgery[191].

It should be noted that some studies that included measures of both generic HRQOL and VRQOL, showed significant improvements in VRQOL after cataract surgery, but no improvement in HRQOL[7, 28, 87, 90]. This is likely because generic measures of HRQOL are not sensitive enough to detect changes in people with visual impairment such as cataract. In conclusion, these studies provide sufficient evidence to conclude that cataract surgery, whether first-eye, second-eye or both-eyes, significantly improves VRQOL and HRQOL. However, the majority of research has been conducted in developed countries where visual impairment prior to cataract surgery is less severe and social circumstances differ considerably[194].

The most recent research examining the impact of cataract surgery on quality of life in a developing country was conducted in southern India[78]. The quality of life of 294 cataract patients aged 40 years and over was assessed before, one month after and a year after first-eye cataract surgery using the 33-item Indian Vision Functioning Questionnaire (IND-VFQ-33)[78]. Significant improvements were found on all subscales of IND-VFQ-33 after first eye cataract surgery. However, this study only examined visual acuity as a measure of visual impairment and assessed the impact of first-eye cataract surgery only[78].

Another prospective study was conducted in urban India and included 288 cataract patients aged 40 years and over[34]. Quality of life was assessed before and three months after first-eye cataract surgery using VRQOL, a 13-item visual function questionnaire (VF-13), and HRQOL, a 12-item quality of life questionnaires (QOL-12). The findings showed a significant improvement in both VF-13 and QOL-12 scores after first-eye cataract surgery. As with the

other Indian study[78], this study used only visual acuity to measure visual impairment and assessed the impact of first-eye cataract surgery only[34].

A prospective study in China recruited 116 cataract patients aged 62 years and over examining the impact of first-eye cataract surgery on quality of life[86]. Quality of life was assessed before, one week, one month, three months and six months after first-eye cataract surgery using generic HRQOL measures, the World Health Organisation 12-item quality of life questionnaire (WHO-QOL-12). The findings showed that quality of life was significantly improved one week after surgery and remained at six months. Again, a weakness of this study was that it used only visual acuity to measure visual impairment and assessed the impact of first-eye cataract surgery only[86].

Further evidence for the benefits of cataract surgery for quality of life comes from a longitudinal multicentre study conducted in Kenya, Bangladesh and the Philippines including older adults aged 50 years and over[192]. The study recruited total of 361 cataract patients who had cataract surgery (132 in Kenya, 112 in the Philippines, and 117 in Bangladesh), 288 cataract patients who had no surgery (62 in Kenya, 126 in the Philippines, and 100 in Bangladesh), and 571 participants without cataracts (128 in Kenya, 163 in the Philippines, and 280 in Bangladesh). VRQOL was assessed by the WHO/PBD VF-20 and HRQOL was assessed by the EQ-5D. Participants were assessed before and one year after their cataract surgery. The findings showed significant improvements in both VF-20 and EQ-5D scores in three countries after cataract surgery. A weakness of this study is that again, only visual acuity was used to assess visual impairment and those who had first-eye and both-eye cataract surgery were combined for the analysis[192].

2.5.5. VRQOL of cataract patients in Vietnam

There is minimal information about the impact of cataract surgery on VRQOL in Vietnam. To date, only one study assessing the impact of cataract surgery

on VRQOL among the Vietnamese population has been conducted[194]. However, the study was conducted in four rural districts of Ha Tinh, a northern province of Vietnam where culture and socioeconomic are different from the south of Vietnam. The findings showed that the VF-14 mean score was 68.7 ± 23.8 and the Aravind quality of life mean score was 73.8 ± 21.6 after cataract surgery. Nonetheless, it cannot provide a good conclusion on the impact of cataract surgery on VRQOL because it only assessed VRQOL of patients after their surgeries and included both those had first and both-eye cataract surgery in the sample. Moreover, the study used only visual acuity to assess visual impairment[194].

A longitudinal study examining the impact of first and second eye cataract surgery on VRQOL, incorporating several measures of visual function would provide useful information on the impact of cataract surgery on VRQOL in Vietnam.

2.6. Depression and cataract patients

2.6.1. The impact of cataract on depression

The WHO has defined depression as "a common mental disorder characterised by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration"[195]. Depression is a significant public health problem, affecting approximately 350 million people worldwide, particularly females[196]. For example, the prevalence of depression among older people in Norway has been reported to be 10-19%, of which 2-4% are severely depressed[197]. Worldwide, one million people commit suicide each year as the result of severe depression[196].

The prevalence of depression among older people with visual impairment has been reported to be as high as 29%[198]. Visual impairment is a risk factor for

depression, as it prevents adults from performing normal activities in their daily lives[198-200]. Cataract therefore possibly increases the risk of depression. Only a few studies have reported on the impact of cataract on depression. A cohort study conducted in Canada consisting of 672 patients waiting for cataract surgery, reported that 26% of the sample had depression[201]. The findings of this study also suggested that poor visual acuity increased the risk of depression by 1.5 times[201]. Other studies have also reported an increase in depressive symptoms among cataract patients who do not undergo cataract surgery[25, 91].

2.6.2. The impact of cataract surgery on depression

Although nine studies have examined the impact of cataract surgery on depression, it remains inconclusive whether depression improves following cataract surgery. Four studies reported that cataract surgery did not reduce depression, be it first-eye, second-eye or bilateral surgery[25-28]. However, the other five studies reported a significant improvement in depression after first-eye cataract surgery[14, 89-91, 193], second-eye cataract surgery[193], and bilateral cataract surgery[91, 193].

The strongest evidence for a reduction in depression with cataract surgery comes from a RCT conducted in the UK[14]. This study assessed 148 cataract patients who had first-eye cataract surgery and 140 cataract patients who were waiting for first-eye cataract surgery before and six months after their surgery using the HADS measure. The findings showed that those who had first-eye cataract surgery had a slight but significant improvement by 0.8 points in HADS scores compared to those who were waiting for first-eye cataract surgery. However, a weakness of this study was that the sample included only women over 70 years old[14].

The most recent study showing a reduction in depression after cataract surgery was a prospective study in USA[90]. However, depression was not significantly

different between those who had cataract surgery and those who did not have cataract surgery four months after surgery. The study included 30 cataract patients who had surgery and 15 cataract patients who did not have surgery. Depression was assessed using the Geriatric Depression Scale (GDS), a 15-item questionnaire, before and four months after cataract surgery. Participants were not randomised into surgery or no-surgery groups. For this reason, those in the cataract surgery group were younger than those in the no-surgery group. Moreover, the study was conducted on a specific population, nursing home residents and did not separate those who had first-eye cataract surgery from those who had second-eye cataract surgery[90].

Another prospective study conducted in the USA also concluded that cataract surgery reduces depression[91]. This study used the CES-D scale for assessing depression. Participants were classified into two groups: expedited surgery (n=122) and no surgery (n=92). It should be noted however, that participants were not randomised into groups, a factor which may have biased the study results. Another limitation of this study is that those who had first-eye cataract surgery and those who had bilateral cataract surgery were combined for analysis. Moreover, the main aim of this study was not to assess the impact of cataract surgery on depression but rather its impact on falls[91].

Another prospective study was conducted in the UK, using the HADS scale[193]. Findings from this study suggest that first-eye, second-eye and bilateral cataract surgery reduce depression. However, this study had a small sample size, with only seven patients in the bilateral cataract surgery group[193].

A prospective cohort study conducted in Australia, included 99 bilateral cataract patients and showed that first-eye cataract surgery slightly improved depressive symptoms. However, this improvement had no clinical significance[89]. This study included only cataract patients who were drivers,

likely representing a high functioning group. Therefore, results may not be generalizable to cataract patients with lower levels of functioning.

The first study, which concluded that cataract surgery does not reduce depression, was conducted in the USA and assessed depression before and after cataract surgery using Center for Epidemiology Studies – Depression (CES-D) scale, a 20-item self-rated questionnaire[25]. A Lower CES-D score indicates fewer depressive symptoms. The study included two comparison groups, a cataract group that had not undergone surgery and a visually normal group. The findings showed no significant improvement in depressive symptoms in the cataract surgery group or the cataract group without surgery, but reported a significant improvement in the visually normal group. A weakness of this study is that it combined those who had first-eye cataract surgery and those who had bilateral cataract surgery for analysis. Moreover, those patients who were lost-to-follow-up were more depressed compared to those who competed the study, a factor which may have biased the findings on the association between cataract surgery and depression[25].

A randomised controlled trial (RCT) conducted in Australia also concluded that first-eye cataract surgery did not improve depression[27]. This study used the Depression Anxiety Stress Scale (DASS) to assess depression. This is a 21-item self-administrated questionnaire, in which lower scores indicate fewer depressive symptoms. Although this study had a strong design, its sample was small, with 25 patients in the intervention group and 20 patients in the control group[27].

Another RCT in the UK concluded that second-eye cataract surgery did not reduce depression. This study had a bigger sample size, with 115 patients undergoing second-eye surgery and 103 patients waiting for second-eye surgery[28]. The study used the Hospital Anxiety and Depression Scale (HADS), a 14-item self-administrate questionnaire to assess depression and

anxiety. A possible limitation of this study was that the sample included only women aged over 70 years and its main aim was not to assess the impact of cataract surgery on depression but rather its impact on falls[28].

The last study, which concluded that cataract surgery does not reduce depression, was conducted in Japan using the Beck Depression Inventory (BDI) measure, which is a 21-item self-administered questionnaire[26]. Lower BDI scores indicate less depressive symptoms. This study showed that after bilateral cataract surgery, the mean BDI score was lower compared to the score before surgery. However, the decrease in the BDI score after surgery was not statistically significant. The limitations of this prospective study include the fact that it was not a randomised study and that it lacked any control group[26].

In conclusion, the studies examined above present conflicting results and have limitations that prevent us from drawing any firm conclusions on the impact of cataract surgery on depressive symptoms. They were conducted on specific populations such as nursing home residents, elderly adults, or females. In addition, some had a small sample size, were not randomised into groups, or lacked a control group. Therefore, it remains unresolved whether first-eye, second-eye or bilateral cataract surgery reduces depression.

2.6.3. Depression in cataract patients in Vietnam

The prevalence of depression among older Vietnamese adults is conservatively estimated at 17.2%[22]. Studies have reported an increased prevalence of depression in cataract patients over the period while they are still waiting for surgery[25, 91, 201]. While nine studies have examined the impact of cataract surgery on depression, they were all conducted in developed countries and provided conflicting results[14, 25-28, 90, 91, 193]. Since the vision of cataract patients in Vietnam before surgery is considerably poorer than patients in developed countries, the prevalence of depression before surgery

and the impact of surgery on depression need to be examined for this population.

2.7. Conclusion

Previous research on the benefits of bilateral cataract surgery in terms of fall prevention, injury prevention, quality of life and depression have frequently been limited by small sample sizes and did not define whether participants had undergone surgery on one or both eyes. To date, there have also been only limited studies that have included multiple objective measures of visual function when examining the impact of cataract surgery on health outcome measures. As a result, the impact of cataract surgery on health-related outcomes such as falls, injuries, VRQOL and depression is open to question, leaving a dangerous gap in literature. In addition, almost all of the evidence to date comes from developed countries. It is possible that cataract and cataract surgery impact differently on falls, injuries, VRQOL and depression in Vietnam due to greater visual impairment pre-surgery, as well as different cultural, lifestyle and family relationship factors among Vietnamese cataract patients. Accurate assessment of the effectiveness of bilateral cataract surgery for reducing falls and injuries and improving VRQOL and depression in Vietnam, including objective visual measures, is essential to provide evidence-based guidelines on the timing of patients' access to cataract surgery; to reduce the financial burden on the healthcare system; and to guide injury prevention interventions for cataract patients.

CHAPTER 3: METHODS

This chapter summarises the research methods used in the study including study design, sample size and sampling, data collection, instruments, data analysis and ethical considerations.

3.1. Study design

This longitudinal prospective study followed a cohort of bilateral cataract patients recruited from the Department of Phaco-emulsification at the Eye Hospital in Ho Chi Minh City. They were assessed three times: one week prior to their first-eye cataract surgery, one to three months after their first or second-eye cataract surgery, and 12 months after their first or second-eye cataract surgery (some participants still only had one eye operated on).

3.2. Study site

Ho Chi Minh City is the largest city and economic capital of Vietnam which is located in the south of the country. The city has 19 urban and five suburban districts with an area of 2,094 square kilometres and a population of over seven million, giving it a high density of 3,500 persons per square kilometre. Most of the city's population, comprising mainly people of Kinh ethnicity, reside in the urban areas. There are many large and high-quality hospitals with highly skilled healthcare professionals located in the city[31, 202].

The Eye Hospital is one of the largest ophthalmological hospitals in southern Vietnam, located in the centre of Ho Chi Minh City. The hospital has 12 departments including phaco-emulsification, glaucoma, cornea, paediatrics, injury, vitreous humour and retina, lasik, diagnostic imaging, diagnosis and treatment, high technology, optical nerves and domestic surgery, and charity.

Figure 1: Vietnam map

3.3. Sample size

It was estimated that a sample size of at least 400 older people with a diagnosis of bilateral cataract were needed to be recruited into the study. This sample size allowed for the assumption that 42% of the sample might be ineligible due to exclusion criteria, a response rate of 99%[194], and an anticipated loss to follow up of 30% based on anecdotal information obtained from the ophthalmologists. It was anticipated that the final sample of approximately 350 people was sufficient to detect a four points change in the NEI VFQ-25 questionnaire from before first-eye surgery to after second-eye cataract surgery based on a standard deviation of 20[150] (α=0.05, power=80%). This sample size was also suitable for detecting a conservative reduction of

7% in the number of falls after cataract surgery based on the assumption that the expected prevalence of falls was 18% in the population of interest[203].

This sample size was achievable based on the fact that in the Eye Hospital, approximately 3,000 cataract surgeries had been performed in 2010, of which approximately 72% had bilateral cataract.

3.4. Sampling

Eligible participants were recruited consecutively from the Eye Hospital in Ho Chi Minh City between July 2011 and July 2013. Participants' medical books were screened for eligibility by the researcher and after consultation with ophthalmologists from the Eye hospital. Only bilateral cataract patients who were scheduled for the first-eye surgery were approached. Eligible participants were recruited by the researcher in the week before their cataract surgery and followed for a maximum of 12 months.

Patients were assessed by one researcher at the hospital in the week before their first-eye cataract surgery. The same researcher was trained and supervised by the ophthalmologists from the Eye hospital when undertaking all visual testing. Patients were given an appointment to return to the hospital to have their second assessment done by the researcher one to three months after their first or second-eye cataract surgery. Every attempt was made to ensure the person returned to the clinic for the second assessment including a phone call the week prior to their appointment. An incentive of a free pair of glasses was offered to each patient after they completed both assessments. If needed, each patient was offered transport to the hospital and back home again. The third assessment was undertaken by a telephone interview.

3.5. Recruitment criteria

3.5.1. Inclusion criteria

Inclusion criteria included a diagnosis of age-related bilateral cataract, scheduled to undergo first-eye surgery, aged 50 years or older, and living independently in the community.

3.5.2. Exclusion criteria

Exclusion criteria included patients who could not read the Vietnamese alphabet, had previous surgery for cataract, injury or diabetes-related cataract, a diagnosis of glaucoma or any other significant ocular diseases, a diagnosis of dementia, Parkinson's disease, schizophrenia, or wheelchair-bound.

3.6. Data Collection

At recruitment, prior to any data being collected, the purpose of the study was explained to all participants. They were given a Participant Information Sheet, had the opportunity to ask questions and their written consent was obtained. All cataract patients were informed that participation was entirely voluntary and they could withdraw from the study at any time without consequence for their current or future cataract treatment. Participants were also assured that all information collected would be kept strictly confidential and used purely for the purpose of this study.

Once informed consent was obtained, the participants completed a researcher-administered questionnaire one week prior to their first-eye cataract surgery and one to three months after their first-eye or second-eye cataract surgery. Each participant underwent three visual function tests which were completed at the hospital by the researcher one week prior to first-eye surgery and at the second assessment. At one year (following either first-eye surgery or second-eye cataract surgery) a follow-up telephone interview was conducted by the

researcher. The researcher asked each participant about the number of falls and other injuries they had experienced since the last interview as well as other descriptive information.

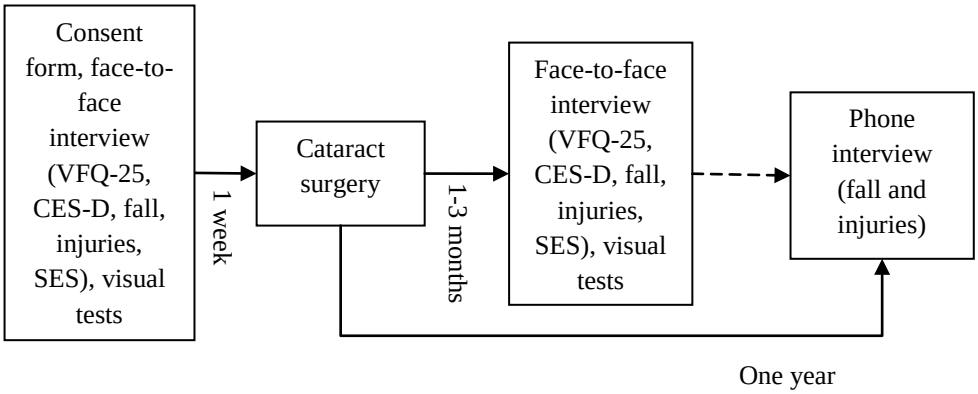

Figure 2: Data collection process

3.7. Questionnaires and Instruments

The researcher-administered questionnaire took approximately 50-60 minutes to complete at the baseline and second assessment. The phone interview took approximately 10 minutes to complete at the third assessment.

3.7.1. Pilot study

A pilot study of 30 bilateral cataract patients from the Eye Hospital was undertaken to confirm the validity and reliability, length and appropriateness of the questionnaire (please see Chapter 4 for more detail). The questionnaire was translated into Vietnamese by an experienced translator. It was translated back to English by a different translator. Content validity of the questionnaires was assessed by a panel of experts in the field of ophthalmology and injury prevention. Modifications were made accordingly.

3.7.2. Questionnaires

The following information was collected by the researcher. Approval for use of the instruments was obtained from the authors where required.

3.7.3. Socio-demographic characteristics

Information collected included age, gender, marital status, education, occupation, religion, ethnic background, current prescribed medications, spectacles worn, and co-morbid conditions. The type of co-morbid conditions included hypertension, heart disease, cancer, stroke, angina, rheumatoid arthritis, osteoarthritis, kidney disease, hearing loss, alcohol abuse, apnoea and other chronic conditions. These conditions were validated using the patients' medical records where possible.

3.7.4. National Eye Institute Visual Function Questionnaire 25-item (NEI VFQ-25)

Vision-related quality of life was assessed using the reliable and valid National Eye Institute Function Questionnaire 25-item (NEI VFQ-25) which was developed by Mangione et al.[150]. The NEI VFQ-25 has been widely used for assessing visual impairments including patients with cataract[150, 204, 205].

The NEI VFQ-25 contains subscales including general health rating, overall vision rating, difficulties with near and distance vision activities, limitations in social functioning due to vision impairment, role limitations, peripheral and colour vision and ocular pain. Some additional questions related to riding a motorcycle and/or driving a motor vehicle were also asked. Each question on this questionnaire was measured on a scale from 0 to 100. The higher the score, the better the VRQOL.

3.7.5. The Centre for Epidemiologic Studies Depression Scale (CES-D scale)

Depressive symptoms were measured using the 20-item Center for Epidemiological Studies-Depression Scale (CES-D)[206]. It includes questions on appetite, hopefulness, happiness, mood, social relationships, and loneliness. The reliability and validity have been reported by Radloff[206]. All questions are scored from 0 to 3 with 0 “rarely or none of the time”, 1 “some or a little of the time”, 2 “occasionally or a moderate amount of the time”, and 3 “most or all of the time”. A continuous overall score between 0 and 60 was produced, with higher scores representing more depressive symptoms. It is generally considered that a score of 16 or higher on the scale represents the presence of significant depressive symptoms[206]. The CES-D has been widely used for assessing depressive symptoms in Vietnam[21, 207, 208].

3.7.6. Falls and other injuries

A fall was defined ‘*as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level’*[99]. Questions were included on the number of falls and other injuries experienced by each participant over the past 12 months and level of severity (whether hospitalised or not), as well as on the activities engaged in when these falls and other injuries occurred. At the second and third assessments, they reported how many times they had fallen since their last interview. Participants were also asked to describe any non fall-related injuries they received. The definition of an injury included a burn, contusion, or laceration[16].

3.7.7. Objective Visual Measures

Three objective visual measures were administered by the researcher at baseline and the second assessment. A standardised protocol for each of these assessments was followed. The researcher was trained in their use by

Ophthalmologists at the Eye Hospital. The use of a light and tape measure ensured that tests were administered under identical conditions each time.

3.7.7.1. Visual acuity

Visual acuity is a measure of the clearness of the vision. Better eye, worse eye and bilateral visual acuity were measured using a Snellen's chart provided by the hospital. The chart was calibrated for a 5-metre distance, using a letter by letter method[209, 210]. Those who could not read any letters were assessed by count fingers, hand motion and light perception[210]. The count fingers, hand motion and light perception are able to be transferred into decimal equivalent. A lower score of logMAR represented better vision[209, 210]. Scores were converted to the logarithm of the minimum angle of resolution (logMAR) scale with possible range of -0.3 to 3 logMAR unit[209].

Figure 3: The Snellen's chart at the Eye Hospital

3.7.7.2. Contrast sensitivity

Contrast sensitivity measures the ability to differentiate between an object and its background. Better eye, worse eye and binocular contrast sensitivity were measured with the “Pelli-Robson” chart calibrated at one metre, according to its standard protocol and expressed as log contrast sensitivity with possible of 0.00 to 2.25 log units[211]. A higher score represented better vision.

Figure 4: The Pelli-Robson chart

3.7.7.3. Stereopsis

Stereopsis is a form of depth perception. Binocular stereopsis was measured using the “Titmus Fly Stereotest” including the Wirt Fly and Circles tests consisting of vectographs. The test was held in front of participants’ faces at

40-centimetre distance. This test can measure a broad range of stereopsis from 3,552 to 40 seconds of arc[212]. The measurement was converted into log unit. The range of log seconds of arc was 1.602 to 3.551. Participants who could not see any image were assigned a score of 3.551 log seconds of arc. A lower score of log seconds of arc represented better vision.

Figure 5: The Titmus Fly Stereotest

3.8. Statistical analyses

3.8.1. Descriptive and Univariate Analyses

Descriptive statistics were assessed at the baseline, second and third assessment. Inferential statistics were undertaken to examine differences/changes over the study period in all variables of interest.

ANOVA and t-tests was used to assess changes in vision-related quality of life score which included the composite and 12 subscale scores, depressive

score, visual acuity, contrast sensitivity and stereopsis before surgery and after first or second-eye cataract surgery. Chi-squared McNemar's tests were used to compare the distribution of categorical outcome variables such as gender, age group, marital status, ethnic background, living alone, educational level, employment, wearing glasses, taking prescribed medications, and co-morbid conditions before and after first or second-eye surgery. Two-sided p-values less than 0.05 were considered significant.

3.8.2. Multilevel Poisson Model

As the number of falls is considered to be count data, a multilevel longitudinal Poisson regression model was undertaken to compare the number of falls during the year before and the year after first or second-eye cataract surgery. The longitudinal nature of the observations renders the application of standard Poisson regression analysis inappropriate. Multilevel modelling is appropriate for analyzing clustered and longitudinal data. Failure to account for this may give rise to misleading results including aggregation bias and model mis-specification due to lack of independence between measurements at different times[213, 214].

For the multilevel model, the hierarchy was defined as level 1 (the repeated measurements), nested within the level 2 unit (the individual subject). This approach allows for the portioning of variance and covariance between each of the levels. This variation may be accounted for by explanatory variables. Multilevel modelling also allows for the use of unbalanced data.

Each variable was added to the base model as a fixed effect to explain falls variation between individuals and the change in falls within each person over time. Explanatory variables included in the model at level 2 were age, gender, education level, marital status, living situation (alone: no/yes), ethnicity, taking prescription medications (no/yes), co-morbid medical conditions including other eye conditions (no/yes), binocular visual acuity, binocular

contrast sensitivity and stereopsis. Another three level variable was added to specify whether a participant had first-eye or both-eyes cataract surgery during the one year follow-up period, compared to the one year before first-eye cataract surgery.

Unfortunately, the sample size was too small to undertake multivariate modelling for non fall-related injuries. All analyses were performed using STATA12.

3.8.3. Generalised Linear Estimating Equations (GEE)

For the two secondary study outcomes, which was the VRQOL composite score and depressive symptoms score, two separate linear GEE models were constructed. The GEE models analysed whether there was a significant change in these outcomes after cataract surgery, while controlling for potential confounding factors. The GEE method, developed by Zeger and Liang, is suitable for repeated measures study designs where observations within each participant are not independent[215]. The GEE model permits specification of a certain working correlation matrix that accounts for within-subject correlation, thus providing more robust regression coefficients[216]. Normal linear GEEs were constructed because each major outcome was analysed as a continuous variable and an exchangeable working correlation structure was adopted.

The study outcomes VRQOL and depressive symptoms were entered as outcome variables in each linear GEE model and time (before or after surgery) was added to the model as an explanatory variable. All potential confounding factors were then entered into the linear GEE model and the before and after surgery outcomes were modelled. In each of the final models, explanatory variables with two sided p-values less than 0.05 were considered significant. All data were coded and analysed using STATA12[217].

3.9. Ethical considerations

The study was approved by the Human Research Ethics Committee of Curtin University (Approval number: HR68/2011), and the Executive Board of the Eye Hospital in Ho Chi Minh City, Vietnam. Ethics approval allowed researchers to recruit and assess participants and to review their medical records. This research conformed to the principles of the Declaration of Helsinki[218] and the National Health and Medical Research Council's National Statement on Ethical Conduct in Human Research[219].

All visual assessments conducted as part of this study were non-invasive and posed no risk or harm. All raw data will be securely stored in a locked filing cabinet at Curtin University and will be retained for a period of five years. No identification information will be kept.

CHAPTER 4: ASSESSING THE RELIABILITY OF THE NATIONAL EYE INSTITUTE 25-ITEM VISUAL FUNCTION QUESTIONNAIRE AMONG BILATERAL CATARACT PATIENTS FOR A VIETNAMESE POPULATION

Chapter four is a published peer-reviewed paper which addressed the first objective to determine the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25) among bilateral cataract patients for a Vietnamese population.

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Research

Assessing the test–retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population

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Aim: *To determine the test–retest repeatability of the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25) for use with older Vietnamese adults with bilateral cataract.*
Methods: *The questionnaire was translated into Vietnamese and back-translated into English by two independent translators. Patients with bilateral cataract aged 50 and older completed the questionnaire on two separate occasions, one to two weeks after first administration of the questionnaire. Test–retest repeatability was assessed using the Cronbach's α and intraclass correlation coefficients.*
Results: *The average age of participants was 67 ± 8 years and most participants were female (73%). Internal consistency was acceptable with the α coefficient above 0.7 for all subscales and intraclass correlation coefficients were 0.6 or greater in all subscales.*
Conclusion: *The Vietnamese NEI VFQ-25 is reliable for use in studies assessing vision-related quality of life in older adults with bilateral cataract in Vietnam. We propose some modifications to the NEI-VFQ questions to reflect activities of older people in Vietnam.*

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Key words: *cataract, NEI VFQ-25, quality of life, repeatability, Vietnamese.*

Introduction

There are many reliable and valid instruments that have been developed to measure health-related quality of life. However, they are not always sufficient for measuring specific aspects related to vision and quality of life. Although instruments such as the Visual Function Index 14, the 5-item Cataract Symptom Score, the Visual Disability Assessment, the Houston Vision Assessment Test and Cataract TyPE Specification questionnaire measure vision-related quality of life, the majority of them focus only on the impact of vision on the performance of daily activities or are only available in English [1]. In contrast, the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25) was developed to assess not only the influence of vision on daily activities but also other mental and social outcomes [2]. Moreover, its versions in Chinese, French, Italian, Japanese, Spanish and Turkish have been shown to be reliable and valid [1,3–13]. However, a Vietnamese version of NEI VFQ-25 is not currently available. Therefore, we conducted this study aiming to assess the test–retest repeatability of the Vietnamese version of NEI VFQ-25 among bilateral cataract patients in Vietnam.

Methods

Participants and data collection

Inclusion criteria for the study were adults aged 50 years or older who were diagnosed with age-related bilateral cataract, living independently in the community and not scheduled for the first eye cataract surgery within a week of the first interview. Patients with previous cataract surgery, injury or diabetes-related cataract and a diagnosis of glaucoma or any other significant ocular conditions were excluded from this study. In addition, patients with a diagnosis of dementia, Parkinson's disease, schizophrenia and those who were wheelchair-bound were also excluded.

Eligible patients were identified based on a diagnosis of bilateral cataract in their medical records. As patients presented at the Ophthalmological Hospital from May 2011 to July 2011 to register for cataract surgery, the researcher approached them and explained the purpose of the pilot study and their right to withdraw at any time without

consequence for their cataract treatment. They were informed that they needed to complete the questionnaire on two separate occasions, at least one to two weeks apart. The one- to two-week period was implemented because it was deemed a long enough period of time for older participants not to recall their previous responses but short enough for no significant change in vision-related quality of life [6–9]. The questionnaire, which included sociodemographic information, was that included sociodemographic information was administered face to face by the researcher. Participants who were interested in the study were provided an information sheet and signed a consent form before any information was collected. The study was approved by the executive committee of the Ophthalmological Hospital and the Curtin University Human Research Ethics Committee and conforms with the Declaration of Helsinki.

The NEI VFQ-25 questionnaire

The NEI VFQ-25 provides a composite score and 12 subscale scores, including general health rating, overall vision rating, difficulties with near and distance vision activities, limitations in social functioning due to vision, role limitations, peripheral and colour vision, and ocular pain. Each subscale contains between one and four items. A small change related to driving a motor vehicle was made to the driving subscale, to reflect the Vietnamese lifestyle, based upon a review of the literature [7,9,10] and expert opinion. For example, the item in the 'driving' subscale was modified to include driving a car and/or riding a bicycle or scooter, as few older Vietnamese people drive cars. To obtain each subscale score, its individual item scores were averaged. To obtain the composite score, 11 of the subscale scores (the general health subscale was excluded) were averaged. The composite and subscale scores were measured on a scale of 0–100, with higher scores representing better vision-related quality of life.

The content validity of the NEI VFQ-25 questionnaire was assessed by a panel of experts in the field of injury prevention and ophthalmology prior to the administration of the questionnaire and minor changes were made accordingly.

At the end of the administration of each questionnaire in the pilot study, participants were asked by the researcher to provide verbal feedback on the appropriateness of the questions as well as the length of the questionnaire. Participants' feedback was recorded by the researcher. The mean time taken to complete the questionnaire was 15 minutes (SD = 3.42).

Translation of the NEI VFQ-25

The original English version of the NEI VFQ-25 was first forward-translated into Vietnamese by an independent translator from a well-known translation centre in Ho Chi Minh City. It was then back-translated into English by a second independent translator from a different centre. The back-translated questionnaire was then compared to the original English NEI VFQ-25 to verify the quality and meaning of the translation.

Statistical analysis

Demographic characteristics of the participants were described. The intraclass correlation coefficient (ICC) was used to assess the test–retest repeatability of the NEI VFQ-25. The Cronbach's α coefficient was used to assess the internal consistency of each subscale of the NEI VFQ-25 for the baseline data. Cronbach's α coefficients could only be calculated for the subscales consisting of at least two or more items. An acceptable ICC and Cronbach's α coefficient should be greater than 0.7 [6]. Analysis was performed using STATA10 and conducted at the 5% significance level.

Results

There were 56 eligible patients, of whom 54 (96%) agreed to participate in the study. However, only 30 patients (55%) came back for the second interview. Table 1 presents the demographic characteristics of the sample. The average age of participants was 67 ± 8 years, ranging from 50 to 81 years. The average income was 2,369,565 Vietnamese Dong (SD: 2,117,124, ranging from 500,000 to 8,000,000) (1 AUD = 22,000 VND). A large majority of the participants were female (73%), of Kinh ethnicity (97%), were employed (63%) and had an education level of junior high school or less (83%). Over half of the participants were married (57%) and Buddhist (50%). Approximately 43% of the participants rode a bicycle or a scooter and only 3% of participants rode both bicycle and scooter at the time of the questionnaire administration.

There was no significant change ($P = 0.22$) in the overall mean NEI VFQ-25 score of the cohort from the baseline administration of the questionnaire (mean score: 51 (SD = 17)) to the second administration of the questionnaire (mean score: 52 (SD = 15)).

Table 1: Demographic and health characteristics of participants ($n = 30$)

Variables		*n*	%
Age; years (mean, SD)		67 (8)	
Gender	Female	22	73
Ethnic background	Kinh	29	97
	Chinese	1	3
Marital status	Married	17	57
	Single/widowed/divorced	13	43
Educational level	Junior high school or less	25	83
	Senior high school or higher	5	17
Religion	No religion	8	27
	Buddhist	15	50
	Catholic	5	16
	Other	2	7
Employment	Employed	19	63
Transport	None	16	54
	Bicycle	6	20
	Scooter	7	23
	Bicycle and scooter	1	3

Table 2: Internal consistency and test–retest repeatability for the Vietnamese NEI VFQ-25

NEI VFQ-25 subscales	Number of items	α	ICC	*P*
General health	1†	NA	0.60	<0.001
General vision	1†	NA	0.56	<0.001
Ocular pain	2	0.82	0.67	<0.001
Near activities	3	0.84	0.70	<0.001
Distance activities	3	0.81	0.82	<0.001
Vision specific				
Social functioning	2	0.71	0.70	<0.001
Mental health	4	0.76	0.81	<0.001
Role difficulties	2	0.89	0.94	<0.001
Dependency	3	0.84	0.87	<0.001
Riding	2	0.84	0.96	<0.001
Colour vision	1†	NA	0.68	<0.001
Peripheral vision	1†	NA	0.73	<0.001
Total score	25	0.93	0.92	<0.001

†Only one item so α could not be calculated as needs two items. ICC, Intraclass correlation coefficient; NA, not applicable.

Table 2 shows the test–retest repeatability for the NEI VFQ-25 multi-item subscales as well as the overall score. The overall Cronbach's α score was high (α = 0.93). Cronbach's α for the subscales ranged from 0.71 to 0.89. The highest Cronbach's α value was obtained for the vision-specific role difficulties subscale (0.89), followed by near activities (0.84), vision-specific dependency (0.84), riding (0.84), ocular pain (0.82), distance activities (0.81), vision-specific mental health (0.76) and vision-specific social functioning (0.71).

The overall ICC was 0.92. The ICCs of all subscales ranged from 0.56 (general vision subscale) to 0.96 (riding subscale) and were statistically significant (*P*-value < 0.001).

A non-response rate of 100% was observed in this study on the NEI VFQ-25 item '*going to see movies, plays, or sports events*' on the distance activities subscale.

Discussion

This study examined the test–retest repeatability for the Vietnamese version of NEI VFQ-25 among bilateral cataract patients in Vietnam. The internal consistency of the NEI VFQ-25 subscales was acceptable with all α coefficients approximately 0.7 or greater and ICCs were 0.56 or greater 0.6 or greater for all subscales. However, minor adjustments were implemented prior to the start of the pilot study so that the Vietnamese NEI VFQ-25 reflected the local culture and lifestyle of the Vietnamese people. First, the NEI VFQ-25 includes a driving subscale consisting of two questions. However, since driving a motor vehicle is uncommon among older people in Vietnam, the NEI VFQ-25 was modified to include '*bicycle and scooter riding*' in this subscale as these are most common forms of transport in Vietnam. Other translated versions of the NEI VFQ-25 had reported a very high non-response rate for the driving subscale, notably the Chinese (95%) [6], Japanese (61%) [7] and Taiwanese (90%) versions [9]. The current study had a non-response rate of 37% for the modified driving subscale, similar to with the French version (35%) [5], but still higher than with the Spanish version (25%) [4]. The observed non-response rate of 37% is most likely due to the Vietnamese culture of adult children caring for and transporting their parents. Secondly, none of the participants in the current study responded to the NEI VFQ-25 item '*going to see movies, plays, or sports events*' on the distance activities subscale. It is uncommon for older people in Vietnam to attend movies, plays or sports events. High non-response rates were also seen for this item on the Chinese (61%) [6], Japanese (32%) [7] and Spanish (10%) [4] versions. Therefore, it is recommended that this item be replaced with '*watching and enjoying TV programs*' for future use of the NEI VFQ-25 in a Vietnamese population.

The mean composite NEI VFQ-25 score among our Vietnamese cohort was 51 (SD = 17) at first administration and 52 (SD = 15) at second administration of the questionnaire. This score was lower (poorer quality of life) than reported in studies of cataract patients conducted in Japan (67, SD = 15) [14], Taiwan (74, SD = 17) [9] and Greece (74, SD = 24) [15]. Unfortunately, we were unable to determine whether this difference was due to Vietnamese cataract patients having poorer vision pre-surgery because visual measures were not collected.

Previous research recruited participants with cataract, glaucoma, age-related macular degeneration, retinal detachment and diabetic retinopathy as part of their validation process [7–9,12], whereas our study included only bilateral cataract patients. However, the results of the analyses in this study were comparable to those in previous research [6,9]. Moreover, the data collection was conducted by one researcher only, which minimized information and systematic biases and increased the study's internal validity. The use of one week between the test–retest visits also ensured that no significant changes in the vision-related and/or systemic functional status of participants took place.

This pilot study has several limitations. The study was conducted with a small sample and had a high attrition rate. There were only 30 participants who completed the two interviews. The small sample size and high attrition in this study may be attributed to the eye hospital system in Ho Chi Minh City. As patients were diagnosed with cataract and their doctors recommended surgery, they could be operated upon immediately. Normally, most patients would have their cataract operation that day. However some patients would wait for a couple of days because they did not have enough money, or had to wait for agreement among their family members and/or for family to make time to be with them for the surgical procedure. Therefore, it was not easy to recruit cataract patients who would wait for at least one week for the two interviews. The study population was also restricted to only those visually impaired patients with cataract who

visited the ophthalmology clinic, which limits the relative generalizability of the results. Lastly, recent research found that the NEI VFQ-25 has suboptimal psychometric properties based on a Rasch analysis and recommended that a two-dimensional structure be used in future assessments, which includes visual functioning [16,17]. Unfortunately, objective visual measures were not collected in this study but should be collected in future studies assessing the psychometric properties of the NEI VFQ-25. Despite these limitations, the Vietnamese NEI VFQ-25 appears to be a reliable instrument and is appropriate to be used for data collection among patients with bilateral cataract in Vietnam. Future studies should assess the effect of the change of clinical outcomes of ophthalmic interventions such as cataract surgery on the scores on the Vietnamese version of the NEI-VFQ 25.

Key Points

- The Vietnamese version of NEI VFQ-25 appears to be a reliable instrument for use in further studies assessing vision-related quality of life in older adults with bilateral cataract in Vietnam.
- Some modifications have been made to reflect the Vietnamese culture.
- The internal consistency of the NEI VFQ-25 subscales was acceptable.

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CHAPTER 5: PREVALENCE AND VISUAL RISK FACTORS FOR A FALL IN BILATERAL CATARACT PATIENTS IN HO CHI MINH CITY

Chapter five is a published peer-reviewed paper which addressed the second objective to determine the prevalence of falls in the twelve months prior to cataract surgery and to examine the association between visual and other risk factors and falls among older bilateral cataract patients in Ho Chi Minh City, Vietnam.

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ORIGINAL ARTICLE

Prevalence and Visual Risk Factors for Falls in Bilateral Cataract Patients in Ho Chi Minh City, Vietnam

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ABSTRACT

Purpose: To determine the prevalence of falls in the 12 months prior to cataract surgery and examine the associations between visual and other risk factors and falls among older bilateral cataract patients in Vietnam.

Methods: Data collected from 413 patients in the week before scheduled cataract surgery included a questionnaire and three objective visual tests.

Results: The outcome of interest was self-reported falls in the previous 12 months. A total of 13% ($n = 53$) of bilateral cataract patients reported 60 falls within the previous 12 months. After adjusting for age, sex, race, employment status, comorbidities, medication usage, refractive management, living status and the three objective visual tests in the worse eye, women (odds ratio, OR, 4.64, 95% confidence interval, CI, 1.85–11.66), and those who lived alone (OR 4.51, 95% CI 1.44–14.14) were at increased risk of a fall. Those who reported a comorbidity were at decreased risk of a fall (OR 0.43, 95% CI 0.19–0.95). Contrast sensitivity (OR 0.31, 95% CI 0.10–0.95) was the only significant visual test associated with a fall. These results were similar for the better eye, except the presence of a comorbidity was not significant (OR 0.45, 95% CI 0.20–1.02). Again, contrast sensitivity was the only significant visual factor associated with a fall (OR 0.15, 95% CI 0.04–0.53).

Conclusion: Bilateral cataract patients in Vietnam are potentially at high risk of falls and in need of falls prevention interventions. It may also be important for ophthalmologists and health professionals to consider contrast sensitivity measures when prioritizing cataract patients for surgery and assessing their risk of falls.

Keywords: Cataract, falls, prevalence, risk factors, Vietnam

INTRODUCTION

Age-related cataract is a serious public health problem worldwide.[1] Cataract is the leading cause of reversible visual impairment and by age 70 years almost everyone will have developed some degree of cataract.[2] Fortunately, surgery is highly successful and is the most commonly performed ophthalmic procedure in many developed and developing countries.[3]

Vietnam is a developing country with a population of 85.9 million people, with 17% aged 50 years or older.[4] The prevalence of blindness is high in Vietnam with cataract accounting for 65% of this blindness.[5,6] There are approximately 1 million cataract cases awaiting surgery in Vietnam and the annual incidence of cataract is conservatively estimated at 84,000 cases per year.[7]

Visual impairment due to cataract is a major risk factor for falls among the older population, who are already at an increased risk of injury.[8] A recent prospective cohort study of injury hospitalizations in Vietnam found that falls and road crashes were the most prevalent injuries, accounting for the highest economic costs.[9] Previous research found that falls

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can lead to loss of independence, depression, anxiety, reduced mobility and social isolation for the older population.[10,11] Falls can also lead to severe personal economic burden for individuals and their families in Vietnam.[9]

Despite the high prevalence of un-operated cataract in Vietnam, no study has investigated the prevalence of falls or examined visual and other risk factors for falls among Vietnamese cataract patients. A meta-analysis of studies from developed countries examining risk factors for a fall among the general older population found increasing age, being female, living alone, previous history of a fall, various medical conditions and medication usage to be associated with increased risk.[12]

Visual impairment comprises defects in different areas of vision such as visual acuity, contrast sensitivity and depth perception. A number of studies have examined the relationship between visual impairment and falls risk in the general older population, with conflicting results.[13,14] Several studies reported that poor visual acuity increases the risk of falls.[15–19] However, recent research has found that reduced contrast sensitivity and depth perception are more important visual risk factors for falls.[14,16,20–22] It should be noted that the majority of existing studies were conducted in developed countries, using the general older population. No study has examined visual risk factors for falls among cataract patients specifically and no study has been conducted in Vietnam, where older adults have much poorer vision than in developed countries.[23]

Given the aging population of Vietnam, issues related to the impact of cataract and the safety of this group is paramount for the assessment and prioritization of individuals for surgery and fall prevention interventions. Therefore, this study aimed to determine the prevalence of falls and to examine the association between visual and other risk factors and falls among older bilateral cataract patients in Ho Chi Minh City, Vietnam.

METHODS

Study Design and Participants

A retrospective study was conducted on patients who were scheduled to undergo cataract surgery between July 2011 and July 2012 at the Eye Hospital in Ho Chi Minh City, Vietnam.

Inclusion criteria were age-related bilateral cataract, scheduled to undergo first eye surgery, aged 50 years or older, and living independently in the community. Exclusion criteria were previous cataract surgery, injury or diabetes-related cataract, a diagnosis of glaucoma or any other significant ocular conditions, a diagnosis of dementia, Parkinson's disease, schizophrenia and being wheelchair-bound. Diabetes-related cataract cases were excluded due to typically younger age of onset and faster progression than other cataract cases. Medical record review and ophthalmologist consultation were used to establish participant eligibility.

Data Collection

Informed written consent was obtained and patients were informed they could withdraw from the study at any time without consequence for their current or future cataract treatment. Data were collected during the week before first eye cataract surgery. A researcher-administered questionnaire developed by the study research team was used to collect information on falls. The number of self-reported falls during the 12 months prior to data collection was collected. A fall was defined as ''an event which results in a person coming to rest inadvertently on the ground or floor or other lower level.'' Where possible, family members who accompanied the patient were asked to verify information on the number of self-reported falls, medications, and comorbid conditions.

Sociodemographic and health variables were also collected via the questionnaire including age, sex, marital status, education, occupation, religion, ethnic background, current prescribed medications, herbal remedies, spectacles worn and comorbid conditions. Comorbid conditions reported included hypertension, cancer, stroke, angina, rheumatoid arthritis, kidney disease, hearing loss, alcohol abuse, sleep apnea, and diabetes.

The questionnaire also contained two commonly used measures of vision-related quality of life and depressive symptoms. However, these items were not included in the current analysis.

The primary researcher translated the questionnaire into Vietnamese, with the assistance of experienced translators. A pilot study of 30 randomly selected cataract patients from the Eye Hospital was undertaken prior to study commencement to confirm content validity, reliability (using Cronbach's alpha and intraclass correlation coefficients), length and appropriateness of the questionnaire. Modifications were made to reflect the Vietnamese context. No modifications were made to the falls-related items.

Objective Visual Measures

Visual acuity (better eye, worse eye and binocular with current lens correction) was measured using a Snellen chart. Scores were expressed on a logarithm of the minimum angle of resolution (logMAR) scale. Contrast sensitivity (better eye, worse eye and binocular with current lens correction) was measured using a Pelli-Robson chart in log units.[24] Stereopsis, a form of depth perception was assessed by the

Titmus Fly Stereotest (Stereo Optical Co Inc, Chicago, IL, USA) which measured disparity from 1.602 to 3.551 log seconds of arc.

Statistical Analysis

A self-reported fall in the previous 12 months was the outcome of interest. Differences between those who fell and those who did not were assessed using independent t-tests for continuous variables and χ^2 analysis for categorical variables.

Multivariable-adjusted logistic regression analysis was undertaken to determine risk factors for a fall after adjusting for potential confounders such as objective visual measures, demographic characteristics, comorbid conditions, medications and whether the participant wore glasses. Analyses were performed separately for better eye and worse eye measures to determine the independent effect of visual function on the risk of a fall. Binocular measures of visual acuity and contrast sensitivity were highly correlated with visual acuity and contrast sensitivity in the better eye, so were not included in the models.

Age was treated as a continuous variable. Worse eye, better eye and binocular visual acuity were analyzed as continuous variables, expressed on a linear scale as logMAR units. Scores were converted to a logMAR scale. Possible scores ranged from −0.3 to 3.0 logMAR units with lower scores indicating better visual acuity. Worse eye, better eye and binocular contrast sensitivity were analyzed as continuous variables with a possible range of 0.00–2.25 log units, with higher scores representing better contrast sensitivity.[24] The stereopsis score was also analyzed as a continuous variable with a possible range of 1.602–3.551 log seconds of arc. Participants who could not see any images were assigned a score of 3.551 log seconds of arc. Stata 10 (StataCorp LP, College Station, TX, USA) was used for all analyses.

Ethical Consideration

The Curtin University Human Research Ethics Committee and the executive board of the Eye Hospital in Ho Chi Minh City approved this study and it complies with the Declaration of Helsinki.

RESULTS

Overall, 434 bilateral cataract patients were consecutively approached, of whom 11 patients refused to participate and 10 patients were excluded due to younger age, a diagnosis of retinal detachment and glaucoma. The final sample was 413 patients resulting in a response rate of 95.2%.

Participants were aged between 50 and 88 years with a mean age of 66.5 years (standard deviation, SD, 7.8). The majority of participants were female ($n = 268$, 64.9%), were married ($n = 239$, 57.8%), lived with family ($n = 383$, 92.7%), were not currently employed ($n = 326$, 78.9%), were of Kinh ethnicity ($n = 401$, 97.1%) and had junior high school level education ($n = 304$, 73.6%). A total of 41% were aged between 60 and 69 years ($n = 170$), 64.9% ($n = 264$) reported at least one comorbidity and 60.5% ($n = 250$) did not take any prescribed medications. Of those taking prescribed medication, the majority took it for hypertension ($n = 107$, 65.6%; Table 1).

A total of 13% (confidence interval, CI, 9.8–16.4%) of patients with bilateral cataract ($n = 53$) reported a total of 60 falls within the previous 12 months. Of this group, 88.7% ($n = 47$) reported one fall, 9.4% ($n = 5$) reported two falls and 1.9% ($n = 1$) reported three falls. Only 8% ($n = 5$) of falls required hospitalization and 56.7% ($n = 34$) required medical care. The majority of participants who fell were female ($n = 46$, 86.7%), did not live alone ($n = 46$, 86.8%), reported at least one comorbidity ($n = 30$, 56.6%), and were not taking any prescribed medications ($n = 33$, 62.2%). 43% of those who fell were aged over 70 years ($n = 23$) and approximately half ($n = 27$, 50.9%) were single.

Those who had a fall in the 12 months before first eye cataract surgery had poorer mean visual acuity in the worse eye (1.22 logMAR), better eye (0.86 logMAR) and binocularly (0.78 logMAR), compared to those who did not fall (Table 2). Participants who reported a fall also had poorer mean contrast sensitivity in the better eye (0.73 log units), worse eye (0.48 log units) and binocularly (0.89 log units) than those who did not report a fall in the previous 12 months. Again, those who reported a fall had poorer mean stereopsis (3.00 log seconds or arc), compared to those who did not fall (2.74 log seconds of arc).

After adjusting for age, sex, ethnicity, marital status, education, employment status, comorbidities, medication usage, refractive management, living status worse eye visual acuity, worse eye contrast sensitivity and stereopsis, women (odds ratio, OR, 4.64, 95% CI 1.85–11.66) and those who lived alone (OR 4.51, 95% CI 1.44–14.14) were at an increased risk of a fall. Those who reported a comorbidity were at decreased risk of a fall (OR 0.43, 95% CI 0.19–0.95). Contrast sensitivity (OR 0.31, 95% CI 0.10–0.95) was the only significant visual factor associated with a fall. As contrast sensitivity increased, the risk of a fall decreased (Table 3).

Table 4 presents the adjusted logistic regression analysis for the better eye visual test scores. Results were quantitatively similar to those for the worse eye, except the presence of a comorbidity was not significant (OR 0.45, 95% CI 0.20–1.02). Again, the only significant visual factor associated with a fall was contrast sensitivity (OR 0.15, 95% CI 0.04–0.53).

TABLE 1. Demographic and health characteristics of bilateral cataract patients in Vietnam by fall status during the previous 12 months.

Variable	Total ($N = 413$)		Fall ($n = 53$)		No fall ($n = 360$)		
	n	%	*n*	%	*n*	%	*p* Value[a]
Sex							
Female	268	64.9	46	86.7	222	61.7	<0.001
Male	145	35.1	7	13.2	138	38.3	
Age, years							
50–59	86	20.8	11	20.7	73	20.8	0.64
60–69	170	41.2	19	35.9	151	41.9	
70+	157	38.0	23	43.4	134	37.2	
Marital status							
Married	239	57.8	26	49.1	213	59.2	0.16
Single/widow/divorced	174	42.1	27	50.9	147	40.8	
Ethnicity							
Kinh	401	97.1	50	94.3	351	97.5	0.21
Other	12	2.9	3	5.6	9	2.5	
Lives alone							
No	383	92.7	46	86.8	337	93.6	0.07
Yes	30	7.3	7	13.2	23	6.4	
Education level							
Junior high school	303	73.4	44	83.0	259	71.9	0.10
Senior high school	110	26.6	9	17.0	101	28.1	
Currently employed							
No	326	78.9	45	84.9	281	78.1	0.25
Yes	87	21.1	8	15.1	79	21.9	
Wears glasses							
No	298	72.2	43	81.1	255	70.8	0.12
Yes	115	27.8	10	18.9	105	29.2	
Takes prescription medication							
No	250	60.5	33	62.2	217	60.2	0.78
Yes	163	39.5	20	37.8	143	39.7	
Comorbid condition							
No	145	35.1	23	43.4	122	33.1	0.13
Yes	268	64.9	30	56.6	238	68.1	

[a]Significant at $p < 0.05$

TABLE 2. Visual characteristics of bilateral cataract patients in Vietnam by fall status during the previous 12 months.

	Total ($N = 413$)	Fall ($n = 53$)	No fall ($n = 360$)	
	Mean (SD)	Mean (SD)	Mean (SD)	*p* Value[b]
Visual acuity (logMAR units)[a]				
Better eye	0.68 (0.43)	0.86 (0.53)	0.66 (0.40)	0.01
Worse eye	1.10 (0.63)	1.22 (0.64)	1.09 (0.63)	0.04
Binocular	0.62 (0.41)	0.78 (0.50)	0.59 (0.39)	0.01
Contrast sensitivity (log units)				
Better eye	0.96 (0.41)	0.73 (0.44)	0.99 (0.40)	<0.001
Worse eye	0.62 (0.46)	0.48 (0.46)	0.65 (0.46)	0.02
Binocular	1.10 (0.45)	0.89 (0.47)	1.14 (0.44)	<0.00
Stereopsis (log seconds of arc)[a]	2.78 (0.71)	3.00 (0.69)	2.74 (0.70)	0.01

[a]Lower scores represent better vision.
[b]Significant at $p < 0.05$
LogMAR, logarithm of the minimum angle of resolution; SD, standard deviation

DISCUSSION

This is the first study to estimate the prevalence of falls among bilateral cataract patients awaiting first eye surgery in Ho Chi Minh City, Vietnam. The prevalence of falls in the year before surgery was 13% (95% CI 9.8–16.4%). This rate of falls coupled with the younger age of the cohort suggests that cataract may increase the risk of falls in Vietnam. In addition, of those who reported a fall,

TABLE 3. Risk factors for a fall among bilateral cataract patients in Vietnam using worse eye visual test scores[a].

Variable	Odds ratio	95% CI	*p* Value[b]
Worse eye visual acuity	0.61	0.28–1.29	0.19
Worse eye contrast sensitivity	0.31	0.10–0.95	0.04
Stereopsis	1.49	0.89–2.49	0.12
Age	1.00	0.96–1.05	0.77
Sex			
Male	1.00		
Female	4.64	1.85–11.66	0.001
Ethnicity			
Kinh	1.00		
Other	4.78	1.02–22.26	0.05
Lives alone			
No	1.00		
Yes	4.51	1.44–14.14	0.01
Married			
No	1.00		
Yes	1.63	0.80–3.33	0.17
Comorbidity			
No	1.00		
Yes	0.43	0.19–0.95	0.03
Wears glasses			
No	1.00		0.64
Yes	1.20	0.53–2.69	
Takes prescribed medication			
No	1.00		
Yes	1.34	0.60–2.95	0.47
Education			
Junior high school	1.00		
Senior high school	0.74	0.33–1.76	0.50
Employed			
No	1.00		
Yes	0.62	0.24–1.57	0.32

[a]Data were obtained from a logistic regression model simultaneously adjusting for all the risk factors listed in the table.
[b]Significant at $p < 0.05$
CI, confidence interval

TABLE 4. Risk factors for a fall among bilateral cataract patients in Vietnam using better eye visual test scores[a].

Variable	Odds ratio[a]	95% CI	*p* Value[b]
Better eye visual acuity	0.66	0.23–1.90	0.38
Better eye contrast sensitivity	0.15	0.46–0.53	0.003
Stereopsis	1.25	0.74–2.11	0.38
Age	1.00	0.95–1.04	0.96
Sex			
Male	1.00		
Female	5.04	1.98–12.83	0.001
Ethnicity			
Kinh	1.00		
Other	4.43	0.90–21.76	0.06
Lives alone			
No	1.00		
Yes	5.08	1.60–16.12	0.006
Married			
No	1.00		
Yes	1.99	0.94–4.17	0.07
Comorbidity			
No	1.00		
Yes	0.45	0.20–1.02	0.06
Wears glasses			
No	1.00		
Yes	1.01	0.46–2.25	0.98
Takes prescribed medication			
No	1.00		
Yes	1.34	0.61–2.95	0.47
Education			
Junior high school	1.00		
Senior high school	0.74	0.31–1.78	0.51
Employed			
No	1.00		
Yes	0.62	0.24–1.60	0.32

[a]Data were obtained from a logistic regression model simultaneously adjusting for all the risk factors listed in the table.
[b]Significant at $p < 0.05$
CI, confidence interval

8% required hospitalization. This is higher than other studies conducted in developed countries.[25–27] Further research is required to confirm these findings and determine reasons for the higher level of hospitalization for a fall.

Contrast sensitivity was the only visual measure significantly associated with the risk of a fall among bilateral cataract patients in Vietnam, after controlling for confounding factors and other visual measures. For both worse eye and better eye contrast sensitivity, as contrast sensitivity score increased (improved), the risk of a fall decreased. The association between falls and contrast sensitivity was stronger for the better eye compared to the worse eye. Neither visual acuity or stereopsis were independently associated with falls risk despite the fact that participants in this study had much poorer visual acuity and stereopsis than cataract patients in studies from developed countries.[10,28] It should be noted however, that this may be due to the small number of falls recorded in this study. Visual acuity is quite heavily relied on for measuring visual disability caused by cataract and prioritizing patients for surgery. However, the results of this study confirm previous findings that contrast sensitivity may also be an important measure.[21] Poor contrast sensitivity was also associated with recurrent falls among older people in the USA[22] and the Netherlands.[20]

Contrast sensitivity frequently decreases as a result of cataract[29] and may be the most important visual risk factor for falls among cataract patients because it is required for detecting and discriminating objects in the environment, using stairs and is particularly important for activities performed in dim light.[30–32]

A recent systematic review of risk factors for falls among older adults concluded that there is good evidence for a link between stereopsis and falls.[14] It is possible that our study did not find this association because cataract causes more impairment to contrast sensitivity than stereopsis.

Most of the cohort who reported a fall were women and this is consistent with previous research.[12] It is possible that the high incidence of falls among women may be due to other health conditions such as osteoporosis. Research suggests that approximately 40% of postmenopausal women will have some type

of osteoporotic fracture during their lifetime.[33,34] Surprisingly, this study did not find a significant relationship between age and falls risk which is not consistent with previous studies.[12] However, the younger age of the sample or small number of falls recorded may explain this.

The results of this study also support previous findings that a person who lives alone is at an increased risk of a fall compared to those who live with others.[12,35] In Vietnamese culture, different generations live together in one house and children take care of their parents. It is possible that cataract patients who live with their adult children may be restricted from doing heavy jobs around the house, thereby limiting their opportunity to fall. Other possible explanations for this finding may include that older people living alone have higher poverty levels, lower social support, undertake less physical activity and have lower assistance in the event of a fall than those who live with others.[35] Interestingly, the presence of a comorbid condition was associated with a decreased risk of falling for the worse eye model. This may be due to people with comorbid conditions being less mobile or active and having less opportunity to fall or again, the small number of falls recorded. There was no significant association between comorbid conditions and falls for the better eye model.

A strength of this study was the inclusion of the three objective visual measures compared to studies that have relied on self-reported visual impairment. In addition, previous studies examining cataract and falls have seldom measured stereopsis. However, the results of this study did not find stereopsis or visual acuity to be a significant risk factor for a fall despite the fact that a large number of participants were considered legally blind in at least one eye. Further research is needed to confirm this finding. Finally, adjustment for other factors which are known to affect the risk of a fall were included such as medication usage, comorbidities and refractive management.

One limitation of this study was the lack of a comparison group who did not have cataract as this would have allowed a comparison of falls prevalence between those with and without cataract. However the authors used patients without falls as the comparison group among cataract patients. Second, falls occurring during the previous year were self-reported, retrospectively. Consequently, the prevalence of falls might have been underestimated due to recall bias, especially if the fall was not serious; however falls information was verified by family members where possible.[36] It should also be noted that the small number of falls reported in this study (60 falls from 53 patients) may have limited the power of the study to detect significant associations. Vision was also measured at the end of the period in which falls were surveyed, making it difficult to determine whether the fall was caused by poor vision. Finally, cognitive ability, peripheral neuropathy, functional measurements, sedating medications specifically and physical activity were not captured or controlled for and are well known risk factors for falls.[37] Prescription medication usage was self-reported, so may also be inaccurate. Despite these limitations, this study has provided new and useful information regarding the prevalence of falls in bilateral cataract patients waiting for surgery in Vietnam, as well as risk factors for falls among this group.

In conclusion, bilateral cataract patients in Vietnam are potentially a group at high risk of falls who are in need of fall prevention interventions such as exercise and environmental modifications. In addition, this study found that contrast sensitivity was the only visual measure significantly associated with risk of a fall after controlling for confounding factors and other visual measures. Therefore, ophthalmologists and health professionals should consider contrast sensitivity measures when prioritizing cataract patients for surgery and assessing their risk of falls.

Finally, recent population-based research from Australia has found that there were in fact more hospital admissions due to injuries from a fall during the year after first eye cataract surgery, than during the year before for bilateral cataract patients.[27] It is therefore important that future research investigates the impact of first and/or bilateral cataract surgery on fall risk for cataract patients in Vietnam.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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CHAPTER 6: THE IMPACT OF CATARACT SURGERY ON VISION-RELATED QUALITY OF LIFE FOR BILATERAL CATARACT PATIENTS IN HO CHI MINH CITY, VIETNAM

Chapter six is a published peer-reviewed journal which addressed the third objective to determine the impact of cataract surgery on vision-related quality of life (VRQOL) and to examine the association between objective visual measures and change in VRQOL after surgery among bilateral cataract patients in Ho Chi Minh City, Vietnam.

HEALTH AND QUALITY OF LIFE OUTCOMES

RESEARCH Open Access

The impact of cataract surgery on vision-related quality of life for bilateral cataract patients in Ho Chi Minh City, Vietnam: a prospective study

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Abstract

Background: To determine the impact of cataract surgery on vision-related quality of life (VRQOL) and examine the association between objective visual measures and change in VRQOL after surgery among bilateral cataract patients in Ho Chi Minh City, Vietnam.

Methods: A cohort of older patients with bilateral cataract was assessed one week before and one to three months after first eye or both eye cataract surgery. Visual measures including visual acuity, contrast sensitivity and stereopsis were obtained. Vision-related quality of life was assessed using the NEI VFQ-25. Descriptive analyses and a generalized linear estimating equation (GEE) analysis were undertaken to measure change in VRQOL after surgery.

Results: Four hundred and thirteen patients were assessed before cataract surgery and 247 completed the follow-up assessment one to three months after first or both eye cataract surgery. Overall, VRQOL significantly improved after cataract surgery ($p < 0.001$) particularly after both eye surgeries. Binocular contrast sensitivity ($p < 0.001$) and stereopsis ($p < 0.001$) were also associated with change in VRQOL after cataract surgery. Visual acuity was not associated with VRQOL.

Conclusions: Cataract surgery significantly improved VRQOL among bilateral cataract patients in Vietnam. Contrast sensitivity as well as stereopsis, rather than visual acuity significantly affected VRQOL after cataract surgery.

Keywords: Vision, Public health, Epidemiology, Cataract, Quality of life

Background

Vietnam is a developing country with a population of 85.9 million people, of which 17% are aged 50 years or older [1]. The incidence rate of cataract was estimated at 170,000 cases per year [2]. The increasing prevalence of cataract, its potential to cause severe visual disability and its impact on quality of life [3] means that a firm understanding of the impact of cataract surgery on visual and other outcomes is important for policy development.

Strong evidence exists that cataract surgery significantly improves vision-related quality of life (VRQOL) [4-6]. However, the majority of research has been conducted in developed countries where visual impairment prior to cataract surgery is less severe and social circumstances differ considerably [7]. A recent study undertaken in rural Vietnam examined quality of life following cataract surgery [7]. However this study was cross-sectional, therefore change in quality of life after surgery could not be assessed.

It is currently unclear which measures of vision are associated with improvement in VRQOL after cataract surgery. Cataract can affect several different aspects of vision with visual acuity being the traditional measure used to assess impairment. However, a prospective study from Spain found that the influence of visual measures on VRQOL changed throughout the different stages of cataract surgery [8]. Before first eye surgery binocular visual acuity was strongly associated with VRQOL. However, after first and second eye surgery stereopsis was most strongly associated with VRQOL, followed by

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binocular contrast sensitivity, with visual acuity showing only a weak association [8]. Similarly, a study in the UK reported that binocular visual acuity was the measure most strongly associated with VRQOL before surgery [9]. However change in VRQOL after surgery was found to be strongly associated with change in stereopsis, followed by binocular contrast sensitivity and least associated with change in visual acuity [9]. A low correlation between change in visual acuity and VRQOL was also found in a study from Finland [10]. The only conflicting results were reported from a study which found that change in visual acuity and disability glare but not contrast sensitivity were associated with change in VRQOL [11]. Stereopsis was not examined in this study.

To date, most studies have used the Visual Function Index (VF-14) to measure VRQOL among cataract patients and the majority were conducted in developed countries [12]. This instrument has been criticised for not addressing all the visual concerns of cataract patients [13], being highly focused on activities that require visual acuity [9] and having ceiling effects [8,9]. The National Eye Institute Visual Function Questionnaire (NEI VFQ-25) addresses a wider range of visual concerns, including social and mental outcomes of visual impairment [14] and allows investigation into which specific aspects of VRQOL improve after cataract surgery.

Therefore this study aims to determine the impact of cataract surgery on VRQOL and examine the association between objective visual measures and change in VRQOL after surgery among bilateral cataract patients in Ho Chi Minh City, Vietnam.

Methods

Study design and sample

A prospective cohort study using a before and after design was undertaken. Inclusion criteria for participants were: age-related bilateral cataract; scheduled to undergo first eye or first and second eye cataract surgery; living independently in the community and aged 50 years or older. Exclusion criteria were: previous cataract surgery; injury or diabetes-related cataract, a diagnosis of glaucoma or any other significant ocular conditions, a diagnosis of dementia, Parkinson's disease, schizophrenia or being wheelchair bound.

Data collection

Participants were recruited between July 2011 and July 2012. Before any data was collected, informed written consent was obtained from each participant. Participation was voluntary and patients were informed they could withdraw from the study at any time without consequence.

Data was collected at two time points at least a week before first eye cataract surgery and one to three months after either first eye surgery or both first and second eye surgery. Information was collected using a researcher-administered questionnaire and three objective visual tests. All cataract surgeries were undertaken by phacoemulsification.

Questionnaire

Demographic data and information on current prescribed medications, refractive lenses worn, and co-morbid conditions were collected via a researcher-administered questionnaire.

The NEI VFQ-25 was used to examine the impact of visual impairment on vision-related quality of life. This questionnaire has been previously validated for use with cataract patients [14]. The basis and design of this questionnaire have been described in full elsewhere [14]. The NEI VFQ-25 was translated into Vietnamese and back translated into English by two independent translators. The "driving" subscale of the NEI VFQ-25 was replaced with a "riding" subscale as motorcycle/moped riding is more common in Vietnam than driving.

Objective visual measures

Three objective measures of vision were administered by the researcher according to hospital protocol. Participants wore their current corrective lenses for visual testing. Binocular visual acuity (with both eyes) was measured using a Snellen chart [15,16]. Scores were expressed on a logarithm of the minimum angle of resolution (logMAR) scale. Binocular contrast sensitivity was measured using a Pelli-Robson chart in log units [17]. Stereopsis, a form of depth perception, was assessed by the Titmus Fly Stereotest (Stereo Optical Co., Inc.) which measured disparity from 1.602 to 3.551 log seconds of arc.

Statistical analysis

Descriptive analyses were undertaken. Inferential statistics were used to compare visual and vision-related quality of life variables before and after surgery.

A generalised linear estimating equations (GEE) model was undertaken to examine the impact of cataract surgery on the VRQOL composite score. The GEE model was fitted for the 247 participants for whom complete before and after surgery data were available. Time (before or after surgery) was added to the model as an explanatory variable.

Binocular measures of visual acuity and contrast sensitivity as well as stereopsis were included as explanatory variables in the model. In addition, potential confounders included in the model were age, gender, education level, employment status, marital status, living situation (alone: no/yes), ethnicity, taking prescription medications (no/yes), co-morbid medical conditions including other eye conditions (no/yes) and wears glasses after surgery (no/yes). A variable was also added to specify whether a

participant had first eye cataract surgery only or both first and second eye cataract surgery during the follow-up period. All statistical analyses were performed using STATA version 10.

Ethical issues

The study was approved by the Curtin University Human Research Ethics Committee (approval number HR68/2011) and the executive board of the Eye Hospital in Ho Chi Minh City, Vietnam.

Results

Four hundred and thirty four bilateral cataract patients were approached to participate in the study, of which 10 refused and 11 did not meet the inclusion criteria for the study. The final sample consisted of 413 patients, resulting in a response rate of 95.1%. Approximately 40% of participants were lost to follow-up with 247 participants completing the second assessment. There were no significant differences between those who completed both assessments and those who completed the baseline assessment only in terms of gender, age, ethnicity, marital status, living alone, education level, co-morbid conditions or baseline NEI VFQ-25 composite scores. However, a significantly greater proportion of participants who completed the study wore glasses ($p = 0.01$) and took prescription medication ($p = 0.03$). Among participants who completed both assessments, 43.3% (n = 107) of patients had first eye cataract surgery only and 56.7% (n = 140) had both first and second eye cataract surgery during the study period.

Table 1 compares participants who completed the baseline assessment (n = 413) and those who completed the baseline and follow up assessment (n = 247) by those who had first eye surgery (n = 107) and those who had first and second eye surgery (n = 140). The majority of participants who had first eye only and both eye surgeries were female (56% and 67.9% respectively); aged between 60-69 years (44.9% and 38.6%); were married (64.5% and 57.9%); had a co-morbidity (60.8% and 61.4%) and did not take any medications (57% and 60%).

Patient's visual test scores before and after cataract surgery are presented in Table 2. Before surgery, participants had a mean binocular visual acuity of 0.58 logMAR (6/23) (SD = 0.38). Among participants who had first eye surgery only (n = 107), mean binocular visual acuity improved by 0.42 logMAR to 0.16 logMAR (6/9) (SD = 0.23). Among participants who underwent both first and second eye surgery (n = 140), mean binocular visual acuity improved by 0.54 logMAR to 0.04 logMAR (6/7) (SD = 0.01). This equated to a clinically meaningful improvement of 21 letters or 4.2 lines on the ETDRS chart for first eye only patients and 27 letters or 5.4 lines for patients who had both eyes operated on. Clinicians often define a change of 0.1 logMAR units or one line on the chart as clinically meaningful [18].

Mean binocular contrast sensitivity before surgery was 1.13 log units (SD: 0.02). Among participants who had first eye surgery only, mean binocular contrast sensitivity improved by 0.56 log units to 1.69 log units (SD = 0.03). Among participants who underwent both first and second eye surgery, mean binocular contrast sensitivity improved by 0.72 log units to 1.85 log units (SD = 0.01). This translated to a clinically significant improvement of over 11 letters or 1.9 lines on the Pelli-Robson chart for patients who underwent first eye surgery only and over 14 letters or 2.4 lines for those who underwent first and second eye surgery. A change of 0.3 log units or one line is often considered to be clinically meaningful [19].

Mean stereopsis before surgery was 2.71 log seconds of arc (SD = 0.70). For participants who underwent first eye cataract surgery only, stereopsis significantly improved by 0.33 log seconds to 2.38 log seconds of arc (SD: 0.62). For participants who underwent first and second eye surgery, stereopsis improved 0.77 log seconds to 1.96 log second of arc (SD = 0.33). A change in stereopsis of 0.30 log seconds of arc is often defined as clinically meaningful [20].

Composite and subscale VRQOL scores for the NEI-VFQ-25 before and after cataract surgery are presented in Table 3. Before surgery, the mean composite VRQOL score was 65.19 points (SD = 16.80). No participant scored the maximum possible composite score of 100.00. For those who had first eye cataract surgery only, composite scores improved on average by 22.83 points to a mean score of 88.02 (SD = 14.51). For those who had first and second eye surgery, composite scores improved by 29.32 points to 94.51 points (SD = 4.94). This change was statistically significant ($p < 0.001$) and clinically meaningful as approximately a six point change in composite score has been considered to be meaningful [21].

VRQOL subscale scores before surgery were lowest for general health with a mean score of 30.97 (SD = 14.34), general vision (mean = 39.43; SD = 11.32), vision specific role difficulties (mean = 42.46; SD = 46.48) and peripheral vision (mean = 45.34; SD = 26.55). Scores were highest for colour vision (mean = 94.23; SD = 12.74) and vision specific social functioning (mean = 86.34; SD = 19.86). There were statistically significant improvements in mean scores for the all the VRQOL subscales after surgery for participants who had first eye surgery only, as well as participants who had both first and second eye surgery. However, all subscale scores were higher after surgery for those who had both eyes operated, compared to those who had first eye surgery only.

The results of the adjusted multivariate GEE linear regression model examining change in composite NEI VFQ-25 score after cataract surgery are presented in

Table 1 Demographic characteristics of participants who completed baseline (n = 413) and follow-up assessments (n = 247)

Variables	Baseline assessment (n = 413)		Follow-up assessment (n = 247)				p-value
			First eye surgery only (n = 107)		Both eye surgeries (n = 140)		
	N	%	N	%	N	%	
Gender							
Female	268	64.9	60	56.1	95	67.9	0.99
Male	145	35.1	47	43.9	45	32.1	
Age (years)							
50-59	86	20.8	28	26.2	30	21.4	0.98
60-69	170	41.2	48	44.9	54	38.6	
70+	157	38.0	31	29.0	56	40.0	
Marital status							
Married	239	57.9	69	64.5	81	57.9	0.95
Single/widow/divorced	174	42.1	38	35.5	59	42.1	
Ethnicity							
Kinh	401	97.1	102	95.3	136	97.1	0.97
Other	12	2.9	5	4.7	4	2.9	
Live alone							
No	383	92.7	99	92.5	134	95.7	0.84
Yes	30	7.3	8	7.5	6	4.3	
Education level							
Junior high school	303	73.4	79	73.8	99	70.7	0.96
Senior high school	110	26.6	28	26.2	41	29.3	
Currently employed							
No	326	78.9	78	72.9	111	79.3	0.92
Yes	87	21.1	29	27.1	29	20.7	
Wears glasses							
No	298	72.2	82	76.6	88	62.9	0.70
Yes	115	27.8	25	23.4	52	37.1	
Takes prescription medication							
No	250	60.5	61	57.0	84	60.0	0.59
Yes	163	39.5	46	43.0	56	40.0	
Co-morbid condition							
No	145	35.1	42	39.3	54	38.6	0.13
Yes	268	64.9	65	60.8	86	61.4	

Table 2 Mean visual test scores before and after cataract surgery (n = 247)

	Before surgery (n = 247) Mean (SD)	After surgery Mean (SD)		p-value**
		First eye surgery only (n = 107)	First and second eye surgery (n = 140)	
Binocular visual acuity (logMAR units)*	0.58 (0.38)	0.16 (0.23)	0.04 (0.12)	<0.001
Binocular contrast sensitivity (log units)	1.13 (0.43)	1.69 (0.32)	1.85 (0.16)	<0.001
Binocular stereopsis (log seconds of arc)*	2.71 (0.70)	2.38 (0.62)	1.96 (0.33)	<0.001

logMAR: logarithm of the minimum angle of resolution, SD: standard deviation.
*Lower scores represent better vision.
**from ANOVA.

Table 3 Vision-related quality of life scores before and after cataract surgery (n = 247)

NEI-VFQ-25 Subscale	Before surgery (n = 247) Mean (SD)	After surgery Mean (SD)		p-value**
		First eye surgery only (n = 107)	First and second eye surgery (n = 140)	
General health	30.97 (14.34)	32.94 (18.04)	34.11 (16.21)	0.04
General vision	39.43 (11.32)	62.06 (17.14)	75.29 (10.35)	p < 0.001
Ocular pain	75.35 (30.69)	84.58 (25.09)	85.00 (23.95)	0.03
Near activities	64.74 (23.27)	86.25 (22.20)	95.42 (9.15)	p < 0.001
Distance activities	70.48 (24.09)	92.06 (17.82)	98.36 (5.86)	p < 0.001
Vision specific				
Social functioning	86.34 (19.86)	96.50 (13.61)	100 (0)	p < 0.001
Mental health	63.11 (28.90)	87.62 (19.58)	95.22 (11.01)	p < 0.001
Role difficulties	42.46 (46.48)	88.90 (30.44)	98.04 (12.39)	p < 0.001
Dependency	78.24 (28.94)	96.73 (9.76)	99.17 (4.93)	p < 0.001
Motorcycle/ moped riding*	51.47 (34.66)	86.86 (28.25)	92.86 (20.50)	p < 0.001
Color vision	94.23 (12.74)	98.26 (11.01)	100 (0)	p < 0.001
Peripheral vision	45.34 (26.55)	89.49 (23.05)	99.29 (4.18)	p < 0.001
Composite score	65.19 (16.80)	88.02 (14.51)	94.51 (4.94)	p < 0.001

*missing information.
**from ANOVA.

Table 4. After adjusting for potential confounders there was a significant improvement of nearly 15 points in the VRQOL composite score after cataract surgery ($p < 0.001$). In addition, those who had first and second eye cataract surgery reported a significant improvement in VRQOL of nearly 4 points ($p < 0.001$) compared to those who had first eye surgery only. Binocular contrast sensitivity and stereopsis were both significantly associated with improvement in VRQOL after surgery, however, visual acuity was not. For every one log unit increase in contrast sensitivity (better vision), VRQOL score also improved by over 13 points ($p < 0.001$). Finally, for every log second increase in stereopsis (poorer vision), VRQOL score decreased by over three points ($p < 0.001$).

Discussion

This is one of the first studies to examine the association between visual function and VRQOL before and after cataract surgery for an ageing population in Vietnam. There was a significant improvement of nearly 15 points in the VRQOL composite score after cataract surgery after controlling for confounding factors. These results are consistent with previous research examining change in NEI VFQ-25 scores after cataract surgery in Japan and the USA [22,23].

A strength of the NEI VFQ-25 questionnaire is that it not only measures difficulty with visual tasks but also the influence of visual impairment on social functioning, mental health, role difficulties and dependency [14]. While large improvements were seen in subscales such as general vision and near activities, they were also seen

Table 4 Generalised linear estimating equation model of vision-related quality of life after cataract surgery (n = 247)

Variable	Coefficient (SE)	95% confidence interval	pcvalue
Before or after surgery: after	14.87 (1.47)	11.98 to 17.75	<0.001*
Surgery: both eyes	3.66 (1.28)	1.13 to 6.19	0.004*
Binocular visual acuity (logMAR)	−2.06 (2.72)	−7.39 to 3.27	0.45
Binocular contrast sensitivity (log units)	13.27 (2.37)	8.62 to 17.92	<0.001*
Stereopsis (log seconds of arc)	−3.31 (0.99)	−5.29 to−1.33	<0.001*
Age (years)	0.06 (0.08)	−0.11 to 0.23	0.46
Gender: female	2.76 (1.53)	−0.23 to 5.76	0.07
Ethnicity: other	−1.01 (3.33)	−7.54 to 5.51	0.76
Lives alone: yes	−0.71 (2.90)	−6.40 to 5.00	0.81
Married: yes	−2.96 (1.52)	−5.94 to 0.21	0.05
Co-morbidity: yes	−2.33 (1.55)	−5.38 to 0.73	0.14
Prescribed medication: yes	2.25 (1.54)	−0.77 to 5.27	0.14
Employed: yes	2.96 (1.61)	−0.20 to 6.13	0.06
Education: > junior high school	1.91 (1.47)	−0.97 to 4.80	0.19
Wears glasses after surgery: yes	1.02 (1.26)	−1.45 to 3.51	0.41

in the vision specific mental health and role difficulties subscales for those who had first eye surgery and surgery in both eyes. This suggests that cataract surgery has benefits not only for daily activities but also has wide reaching social and mental health benefits. It should be noted however, that the NEI VFQ-25 has been criticised for its lack of unidimensionality as it measures a combination of visual functioning and socioemotional constructs [24]. This may decrease the validity of the composite score.

The results also confirmed that while bilateral cataract patients who had only first eye surgery experienced improvement in VRQOL, those who had both eyes operated on experienced a significantly greater improvement of nearly four points on the NEI-VFQ-25. They also scored better on each of the subscales after surgery, compared to those who had first eye surgery only. This finding highlights the importance of recommending second eye surgery to bilateral cataract patients.

A strength of this study was the inclusion of the three objective visual measures. Previous studies examining the impact of cataract surgery on VRQOL have seldom measured stereopsis, which was significantly associated with improved VRQOL. A further strength of the study is that it also examined the impact of cataract surgery on VRQOL for bilateral cataract patients who had only first eye surgery compared to those who had both eyes operated on. First-eye surgery has been shown to bring about significant improvements in visual acuity, contrast sensitivity and stereopsis. The results of this study confirm these findings with significant clinical improvements found after cataract surgery for binocular measures of vision despite mean baseline vision of participants in our study being worse than that of participants in studies from developed countries such as Spain and Denmark [4,8,25].

Improvement in contrast sensitivity and stereopsis were associated with an improvement in VRQOL after surgery, however visual acuity was not. This finding is consistent with previous research [8,9]. Visual acuity is the most commonly used measure for assessing visual impairment and prioritising cataract patients for surgery. These findings indicate that contrast sensitivity and stereopsis may also be important measures to consider when determining the level of impairment caused by cataract. Contrast sensitivity is important for many everyday activities and the performance of tasks in low light, as the environment contains several low contrast stimuli [9,26,27]. Therefore, it is likely that contrast sensitivity is important for VRQOL. A UK-based trial of first eye cataract surgery also reported that change in VRQOL after surgery was most strongly related to change in stereopsis, followed by contrast sensitivity [9]. Further research is required to elucidate the mechanism by which stereopsis may impact on quality of life outcomes. Finally, the study is strengthened by the adjustment for other factors which are well known confounders of vision-related quality of life in an ageing population, such as medication usage, co-morbidities including other ocular conditions and wearing glasses.

The lack of a suitable comparison group that had cataract, but did not have surgery was a limitation of the study. However the "before and after" design using the same person as their own control would account for other inter-individual differences that can confound studies using separate control groups. Cognitive ability was also not captured and is a well-known confounder in research with an older population. In addition, there was a high drop-out rate for the study (40%). This is because many participants were unable to return to the hospital for their follow-up assessment.

Conclusions

In conclusion, this study has provided valuable information about change in VRQOL after surgery in Vietnam. Cataract surgery significantly improved VRQOL among bilateral cataract patients in Vietnam. Contrast sensitivity as well as stereopsis, rather than visual acuity significantly affected VRQOL after cataract surgery. Due to the benefits that cataract surgery has for VRQOL, ensuring that the older population has access to regular eye examinations and timely treatment for cataract is paramount.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

KGT, LBM and MLF contributed to the study design, data analysis, interpretation of results and preparation of the manuscript. KGT also conducted and managed the study. DVD and DVD contributed to the design and management of the study and reviewed the manuscript. VNH, QGT, TDP, HHT and NDN provided management for the study and reviewed the manuscript. QGT also assisted with data analysis. All authors read and approved the final manuscript.

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CHAPTER 7: THE IMPACT OF CATARACT SURGERY ON DEPRESSIVE SYMPTOMS FOR BILATERAL CATARACT PATIENTS IN HO CHI MINH CITY, VIETNAM

Chapter seven is a published peer-reviewed journal which addressed the fourth objective to determine the impact of cataract surgery on depressive symptoms and to examine the association between objective visual measures and change in depressive symptoms after surgery among a Vietnamese population in Ho Chi Minh City, Vietnam.

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The impact of cataract surgery on depressive symptoms for bilateral cataract patients in Ho Chi Minh City, Vietnam

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ABSTRACT

Background: Depression is common among older populations with cataract. However, the impact of cataract surgery on depression in both developed and developing countries remains unclear. The aim of this study is to determine the impact of cataract surgery on depressive symptoms and to examine the association between objective visual measures and change in depressive symptoms after surgery among a Vietnamese population in Ho Chi Minh City.

Methods: A cohort of older patients with bilateral cataract were assessed the week before and one to three months after first eye surgery only or first- and second-eye cataract surgeries. Visual measures including visual acuity, contrast sensitivity, and stereopsis were obtained. Depressive symptoms were assessed using the 20-item Center for Epidemiological Studies-Depression Scale (CES-D). Descriptive analyses and a generalized estimating equations (GEE) analysis were undertaken to determine the impact of cataract surgery on depressive symptoms.

Results: Four hundred and thirteen participants were recruited into the study before cataract surgery. Two hundred and forty-seven completed the follow-up assessment after surgery. There was a significant decrease (improvement) of one point in the depressive symptoms score ($p = 0.04$) after cataract surgery, after accounting for potential confounding factors. In addition, females reported a significantly greater decrease (improvement) of two points in depressive symptom scores ($p = 0.01$), compared to males. However, contrast sensitivity, visual acuity, and stereopsis were not significantly associated with change in depressive symptoms scores. First-eye cataract surgery or both-eye cataract surgery did not modify the change in depressive symptoms score.

Conclusion: There was a small but significant improvement in depressive symptoms score after cataract surgery for an older population in Vietnam.

Key words: cataract surgery, visual measures, depression

Introduction

Age-related cataract is a serious eye disease and a global public health problem (Brian and Taylor, 2001). Vietnam has a population of approximately 86 million people, of which 17% are aged 50 years and older (General Statistics Office of Vietnam, 2010). Cataract accounts for 65% of blindness in Vietnam (ORBIS, 2008) (Vietnam Vision Project, 2013). The prevalence of cataract among the older population in Vietnam is approximately 2% (Vietnam Vision Project, 2013). The annual incidence of cataract and cataract surgery was conservatively estimated at 170,000 cases and over 120,000 surgeries, respectively (Vietnam Vision Project, 2013). The incidence of cataract surgery is also projected to increase as the population ages.

Depression is another major health issue for older adults in Vietnam, affecting 16%–47% of this age group (Tran *et al.*, 2003; Wada *et al.*, 2005; Leggett *et al.*, 2012). It has been found to be associated with lower quality of life and reduced activities of daily living (Vietnam Vision Project, 2013). Previous research indicated that

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vision impairment among older adults can impact on both physical functioning and psychological well-being (Horowitz, 2004). Depression is also common among older populations with cataract with a Canadian study, reporting a prevalence of 26% in the sampled population (Wada *et al.*, 2005). However, the impact of cataract surgery on depression in both developed and developing countries remains unclear. A study by Harwood *et al.* (2005) in the United Kingdom reported a small improvement in depressive symptoms after first eye cataract surgery. In addition, a recent Australian population-based study found a significant decrease of 18% in the number of mental health contacts (mental healthcare received in ambulatory (community and outpatient), inpatient and residential mental health settings) for depression and/or anxiety in the first year after cataract surgery (Meuleners *et al.*, 2012). The corresponding reduction in healthcare costs for treatment of depression and/or anxiety was 28%. However, several other studies have found no significant change in depressive symptoms after first- and/or second-eye cataract surgery (McGwin *et al.*, 2003; Walker *et al.*, 2006; Ishii *et al.*, 2008; Freeman *et al.*, 2009).

The impact of cataract surgery on depression has not been investigated for an older Vietnamese population living in the community. It is also unknown which measures of vision may affect change in depression after cataract surgery for this group. To date, very few studies have examined the association between visual measures and change in depression after cataract surgery, and most only examined visual acuity. Therefore, the aim of this study is to determine the impact of cataract surgery on depressive symptoms and to examine the association between objective visual measures and change in depressive symptoms after surgery among a Vietnamese population.

Methods

Study design and sample

A prospective cohort study using a before and after design was undertaken and included participants aged 50 years and older who presented to the Eye Hospital in Ho Chi Minh City, Vietnam, and were scheduled to undergo first eye cataract surgery.

The inclusion criteria were: a diagnosis of bilateral cataract; people living independently in the community, and were aged 50 years or older. Exclusion criteria were: people who had cataract surgery previously, an injury or a diabetes-related cataract, a diagnosis of glaucoma or any other significant ocular conditions diagnosed before the date of the interview. In addition, patients with a diagnosis of dementia, Parkinson's disease, schizophrenia, and those who were wheelchair bound were also excluded.

Data collection

Eligible participants were recruited consecutively from the Eye Hospital between July 2011 and July 2012. Participants' medical records were screened for eligibility by the researcher. Each eligible participant was provided with information about the study (including the purpose, involvement, and confidentiality of information) and their right to withdraw at any time without negative impact to their treatment. Once informed consent was obtained, a face-to-face questionnaire was administered by the researcher and three objective measures of visual function were assessed.

Information was collected at two time points for each participant; during the week before first eye cataract surgery and approximately one to three months after their most recent surgery (first eye surgery for those who had only one eye operated on and second eye surgery for those who had both eyes operated on). The one month after surgery period was chosen to allow the operated eye(s) to recuperate. Participants who had surgery on both eyes had the two surgeries within a very short time period. The mean length of time between the two surgeries was 18 days (SD = 14). The majority (95%) of patients had their worse eye operated on first, which was defined by visual acuity. All cataract procedures were undertaken by phaco-emulsification.

Questionnaire

The following self-reported information was collected from each participant: age, gender, place of birth, marital status, education, occupation, religion, ethnic background, current prescribed medications, spectacles worn, and comorbid conditions. The types of comorbid conditions included hypertension, heart disease, cancer, stroke, angina, rheumatoid arthritis, kidney disease, hearing loss, alcohol abuse, sleep apnea, hypertension, diabetes, and other chronic conditions.

Depressive symptoms were measured using the 20-item Center for Epidemiological Studies-Depression Scale (CES-D) (Radloff, 1977). It includes questions on appetite, hopefulness, happiness, mood, social relationships, and loneliness. The reliability and validity have been reported by Radloff (1977). All questions are scored from 0 to 3 with 0 "rarely or none of the time," 1 "some or a little of the time," 2 "occasionally or a moderate

amount of the time," and 3 "most or all of the time." A continuous overall score between 0 and 60 was produced, with higher scores representing more depressive symptoms. It is generally considered that a score of 16 or higher on the scale represents the presence of significant depressive symptoms (Radloff, 1977). The CES-D was translated into Vietnamese and back translated into English by two independent translators. The CES-D has been widely used for assessing depressive symptoms in Vietnam (Franks and Faux, 1990; Tran *et al.*, 2003; Leggett *et al.*, 2012).

Objective visual measures

Three objective measures of vision (visual acuity, contrast sensitivity, and stereopsis) were assessed by the researcher under the guidance of the hospital's ophthalmologists. A standardized protocol for each of these assessments was followed.

Participants' current lens correction was used for visual testing. Visual acuity (first eye, second or unoperated eye, and binocular) was measured using a Snellen chart (Ferris *et al.*, 1982; Holladay, 1997). Scores were converted to a logarithm of the minimum angle of resolution (logMAR) scale and those who could not read any letters were assessed by count fingers, hand motion, and light perception (Holladay, 1997). Contrast sensitivity (first eye, second or unoperated eye, and binocular) was measured using a Pelli–Robson chart in log units (Pelli *et al.*, 1988). Binocular measures of visual acuity and contrast sensitivity only are presented in this paper. Stereopsis, a form of depth perception, was assessed by the Titmus Fly Stereotest (Stereo Optical Co., Inc., 2009), which measured disparity from 1.602 to 3.551 log seconds of arc. Participants who could not see any images were assigned a score of 3.551 log seconds of arc (Stereo Optical Co., Inc., 2009).

Statistical analysis

Descriptive analyses were undertaken to compare visual and descriptive characteristics as well as depressive symptom scores before and after cataract surgery. A generalized linear estimating equations model was undertaken for the 247 participants for whom complete data was available. The generalized estimating equations (GEE) model analyzed whether there was a significant change in depressive symptoms score after cataract surgery. The outcome of interest, depressive symptoms score, was entered as repeated variable and time (before or after surgery) was added to the model as an explanatory variable. All potential confounding factors were then entered into the model and the time (before or after surgery) variable was modeled while controlling for these.

In addition to the visual variables (binocular visual acuity, binocular contrast sensitivity, and stereopsis), potential confounders tested in the model were age, gender, education status, employment status, marital status, ethnicity, taking prescription medications (no/yes), comorbid medical conditions, which included other eye conditions (no/yes), new glasses after surgery, and living status (alone no/yes). These variables were selected based on findings of previous studies that identified them as potential confounding factors. A variable was also added to differentiate whether the person had only first-eye cataract surgery or both-eye cataract surgery since the first assessment. All statistical analyses were performed using STATA 12.

Ethical issues

The study was approved by the Curtin University Human Research Ethics Committee and the executive board of the Eye Hospital in Ho Chi Minh City, Vietnam.

Results

Four hundred and thirty-four bilateral cataract patients were initially identified as eligible to be part of the study. From those approached, 10 refused to participate and 11 were later excluded, resulting in a response rate of 95.1% and a sample of 413 patients. Nearly 40% of the initial participants were lost to follow up. There were no significant differences in those who were lost to follow up in terms of gender ($p = 0.27$) and age ($p = 0.19$). From the final sample of 247 participants, 107 (43.3%) underwent first eye cataract surgery and 140 (56.7%) patients had first- and second-eye cataract surgeries during the one to three month follow-up period.

The average age of the participants before cataract surgery was 66.5 years (SD = 7.8) with a minimum of 50 years and a maximum of 88 years. A large majority of participants were female ($n = 268$, 64.9%), aged between 60 and 69 years ($n = 170$, 41.2%), were married ($n = 239$, 57.9%), lived with family ($n = 383$, 92.7%), were not working ($n = 326$, 78.9%), were of Kinh ethnicity ($n = 401$, 97.1%), and 73.4% had attended junior high school. Sixty-four percent ($n = 264$) also reported at least one comorbidity and 60.5 % ($n = 250$) were not prescribed any medications. The average number of comorbidities was one (SD = 1.01) with a minimum of one and a maximum of five. Prescribed medications were most commonly taken for hypertension ($n = 107$, 65.6%). Thirteen

Table 1. Demographic characteristics of bilateral cataract patients who underwent first eye cataract surgery only ($n = 107$) and both eye surgeries ($n = 140$), Ho Chi Minh City, Vietnam

	FIRST EYE ONLY ($n = 107$)		BOTH EYES ($n = 140$)		TOTAL ($n = 247$)		
VARIABLES	N	%	N	%	N	%	p-VALUE*
Gender							
Female	60	56.1	95	67.9	155	62.7	0.95
Male	47	43.9	45	32.1	92	37.2	
Age (years)							
50–59	28	26.2	30	21.4	58	23.5	0.97
60–69	48	44.9	54	38.6	102	41.3	
70+	31	29.0	56	40.0	87	35.2	
Marital status							
Married	69	64.5	81	57.9	150	60.7	0.95
Single/widow/divorced	38	35.5	59	42.1	97	39.3	
Ethnicity							
Kinh	102	95.3	136	97.1	238	96.3	0.99
Other	5	4.7	4	2.9	9	3.6	
Live alone							
No	99	92.5	134	95.7	233	94.3	0.84
Yes	8	7.5	6	4.3	14	5.6	
Education level							
Junior high school	79	73.8	99	70.7	178	72	0.97
Senior high school	28	26.2	41	29.3	69	28	
Currently employed							
No	78	72.9	111	79.3	189	76.5	0.91
Yes	29	27.1	29	20.7	58	23.5	
Wears glasses							
No	82	76.6	88	62.9	170	69	0.71
Yes	25	23.4	52	37.1	77	31	
Takes prescription medication							
No	61	57.0	84	60.0	145	59	0.61
Yes	46	43.0	56	40.0	102	41.3	
Comorbid condition*							
No	42	39.3	54	38.6	96	38.9	0.11
Yes	65	60.8	86	61.4	151	61.1	

*Comorbid conditions included hypertension, heart disease, cancer, stroke, angina, rheumatoid arthritis, kidney disease, hearing loss, alcohol abuse, sleep apnea, and diabetes.

participants (3.2%) had a secondary comorbid eye condition in addition to cataract including age-related macular degeneration or pterygium.

Similarly, among patients who completed the follow-up assessment ($n = 247$) those who had first eye surgery only ($n = 107$) and first- and second-eye cataract surgeries ($n = 140$) were mainly women (56.1% and 67.9%, respectively), were married (64.5% and 57.9%, respectively), were of Kinh ethnicity (95.3% and 97.1%, respectively), did not live alone (92.5% and 95.7%), had a comorbid condition (60.8% and 61.4%, respectively), but did not take any prescription medication (57.0% and 60.0%). However, the majority of those who had both first- and second-eye cataract surgeries were slightly older (40.0% were aged 70 years or older) than those who had first eye cataract surgery only (44.9% were aged between 60 and 69 years) (Table 1).

Table 2 presents the patient's visual test and depressive symptom scores before and after cataract surgery. Before cataract surgery, the mean binocular visual acuity was 0.58 logMAR (SD = 0.38). After surgery, visual acuity improved to 0.16 logMAR (SD = 0.23) for those who had first eye surgery only ($n = 107$) and to 0.05 logMAR (SD = 0.12) for those who had both first- and second-eye cataract surgeries ($n = 140$).

Before surgery, mean binocular contrast sensitivity was 1.13 log units (SD = 0.43). After surgery, contrast sensitivity improved to 1.69 log units (SD = 0.32) for those who had first eye surgery only and to 1.85 log units (SD = 0.16) for those who had both first- and second-eye cataract surgeries.

Table 2. Mean binocular visual characteristics scores and mean scores for CES-D before and after first- and second-eye cataract surgeries ($n = 247$)

	BEFORE SURGERY ($n = 247$)	AFTER FIRST SURGERY ($n = 107$)	AFTER SECOND SURGERY ($n = 140$)	
	MEAN (SD)	MEAN (SD)	MEAN (SD)	p-VALUE
Visual acuity (logMAR units)*	0.58 (0.38)	0.16 (0.23)	0.05 (0.12)	<0.001
Contrast sensitivity (log units)**	1.13 (0.43)	1.69 (0.32)	1.85 (0.16)	<0.001
Stereopsis (log seconds of arc)*	2.72 (0.70)	2.38 (0.63)	1.96 (0.33)	<0.001
CES-D scale***	8.46 (7.40)	6.28 (6.84)	5.31 (6.26)	<0.001

*logMAR: logarithm of the minimum angle of resolution.
**Lower scores represent better vision.
***Higher CES-D scales represent more depressive symptoms.
NOTE: SD = standard deviation; CES-D = Center for Epidemiological Studies-Depression.

Table 3. Generalized Linear Estimating Equation Model of depression score after cataract surgery, Ho Chi Minh City, Vietnam ($n = 247$)

VARIABLE	COEF	SE	95%CI	p-VALUE*
Before or after surgery: after	−1.37	0.74	−2.82 to 0.08	0.04*
Surgery: both eyes	−0.68	0.75	−2.14 to 0.90	0.36
Visual acuity (logMAR units)	0.76	1.40	−1.98 to 3.51	0.58
Contrast sensitivity (log units)	−1.03	1.23	−3.44 to 1.40	0.40
Stereopsis (log seconds of arc)	0.39	0.52	−0.63 to 1.41	0.45
Age (years)	−0.01	0.05	−0.10 to 0.09	0.94
Gender: female	−2.28	0.88	−4.01 to −0.55	0.01*
Ethnicity: other	−2.02	1.94	−5.91 to 1.77	0.30
Lives alone: yes	0.96	1.65	−2.27 to 4.18	0.56
Married: yes	−0.58	0.88	−2.30 to 1.15	0.51
Comorbidity: yes	1.19	0.86	−0.48 to 2.84	0.16
Prescribed medications: yes	0.46	0.84	−1.19 to 2.10	0.58
Employed: yes	−0.90	0.93	−2.72 to 0.92	0.33
Wears glasses: yes	−0.25	0.70	−1.56 to 1.06	0.70
Education: >high school	−0.28	0.86	−1.95 to 1.40	0.74

*significant at $p < 0.05$.
NOTE: 95%CI = 95% confidence interval; SE = standard error.

Before surgery, mean stereopsis was 2.72 log seconds of arc (SD = 0.70). For participants who underwent first eye cataract surgery only, stereopsis significantly improved to 2.38 log seconds of arc (SD = 0.63). For participants who underwent first- and second-eye cataract surgery, stereopsis improved to 1.96 log second of arc (SD = 0.33).

Overall depressive symptom scores before and after first- and both-eye cataract surgeries are also presented in Table 2. Before cataract surgery, the mean depressive symptom score was 8.46 points (SD = 7.40) with 16.2% ($n = 40/247$) of the cohort scoring 16 or over on the CES-D scale. After first eye surgery, mean depressive symptom scores significantly improved to 6.28 (SD = 6.84) and to 5.31 (SD = 6.26) for those who had both eyes operated on. However, after surgery 8% of those who had first eye surgery only ($n = 9/107$) and those who had both eyes operated on ($n = 11/140$) still reported significant depressive symptoms (score of 16 or over).

The results of the multivariate GEE linear regression model examining the change in depressive symptom scores after cataract surgery are presented in Table 3. After adjusting for age, gender, ethnicity, marital status, education, employment status, comorbidities, medication usage, refractive management, and living status, there was a significant decrease (improvement) of one point in the depressive symptoms score ($p = 0.04$) after cataract surgery. In addition, females reported a significantly greater decrease (improvement) of two points in depressive symptom scores ($p = 0.01$), compared to males. However, binocular contrast sensitivity, binocular visual acuity, and stereopsis were not significantly

associated with change in depressive symptom scores. There was also no significant difference in change in depressive symptom scores between patients who had first eye surgery only and those who had both eyes operated on.

Discussion

This is one of the first studies to examine the impact of cataract surgery on depressive symptoms for an ageing population in Vietnam. The results found a small but significant improvement in depressive symptom scores after cataract surgery. However, there was no difference in change in depressive symptoms score between those who had first eye cataract surgery and those who had both eyes operated on. Similarly, a UK-based randomized controlled trial (RCT) of older women who underwent first eye cataract surgery reported a small improvement in depressive symptoms, compared to a no surgery group (Harwood *et al.*, 2005). However, a second UK-based RCT of older women who underwent second eye surgery found no difference in depressive symptoms (Foss *et al.*, 2006). The results of our study may provide support to these previous findings that first but not second eye cataract surgery has a small benefit for depressive symptoms. It should be noted that it is possible that a change in depressive symptoms may not have yet occurred for some of the patients if the timing of the follow-up assessment was done shortly after cataract surgery. Surprisingly, while our study found a clinically significant improvement in visual acuity, contrast sensitivity, and stereopsis after first- and both-eyes cataract surgeries, these were not significantly associated with an improvement in depressive symptom scores.

Previous research has reported conflicting results. A RCT by Datta *et al.* (2008) found that only visual acuity was negatively associated with depression. However, these studies were conducted in developed countries. It is also possible that the low prevalence of depressive symptoms before surgery in the current study may provide an explanation for the study results. The study also found that being female was associated with a significantly greater reduction (improvement) in depressive symptom scores after cataract surgery and is consistent with previous studies (Franks and Faux, 1990; Owsley *et al.*, 2007; Freeman *et al.*, 2009). It is well known that depression is more prevalent in women than men, including in Vietnam (Leggett *et al.*, 2012) and this may have contributed to the gender differences observed in this study.

The prevalence of depressive symptoms among this Vietnamese cohort of bilateral cataract patients was found to be 16%. These results are consistent with a multicenter study conducted on an ageing population (60 years and older) in Indonesia, Vietnam, and Japan, which found the prevalence of depression to be approximately 17% (Wada *et al.*, 2005). A separate Vietnamese study on adults aged 55 years or older found the prevalence of depression to be approximately 47% (Leggett *et al.*, 2012), whereas another Vietnamese study found the prevalence of depression to be 24% (Tran *et al.*, 2003).

The lack of a suitable comparison group that had cataract, but did not have surgery was a limitation of the study, although the "before and after" design using the same person as their own control would have accounted for interindividual differences that can confound studies using separate control groups. The self-reported nature of depressive symptoms in this study may also contribute to the validity of the data as well as the variable follow-up period of one to three months after cataract surgery. Unfortunately, information on daily activities and physical activity levels was not collected in this study and should be in future studies, examining the impact of visual impairment on depression. Another limitation was that cognitive ability was not captured in the study and is a well-known confounder in research with an older population (Pelli *et al.*, 1988; Holladay, 1997; McGwin *et al.*, 2003; 2006; Walker *et al.*, 2006; Ishii *et al.*, 2008).

In conclusion, there was a small but significant improvement in depressive symptom scores after cataract surgery for an older population in Vietnam. However, there was no difference in change in depressive symptom score between those who had first eye cataract surgery and those who had both eyes operated on. Changes in contrast sensitivity, visual acuity, and stereopsis were not associated with depressive symptom scores. Further research is needed with a longer follow-up time to determine the impact of visual measures on depressive symptoms after cataract surgery.

Conflict of interest

None.

Description of author's roles

All listed authors have made a substantial contribution to conception and design, acquisition of data, analysis and interpretation of data, drafting the paper or revising it critically, and have approved the final version for publication. K. G. To, L. B. Meuleners, and D. V. Duong designed the study;

K. G. To, V.-A. N. Huynh, T. D. Phi, D. V. Do, H. H. Tran, and N. D. Nguyen collected and managed the data; K. G. To, L. B. Meuleners, and M. L. Fraser analyzed and interpreted the data and wrote the paper.

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CHAPTER 8: A LONGITUDINAL STUDY OF THE IMPACT OF FIRST AND SECOND EYE CATARACT SURGERY ON FALLS AND OTHER INJURIES IN VIETNAM

Chapter eight is a published peer-reviewed paper which addressed the fifth objective that is to determine the impact of first and both-eyes cataract surgery on the number of falls and injuries among bilateral cataract patients in Ho Chi Minh City, Vietnam.

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ORIGINAL RESEARCH

A longitudinal cohort study of the impact of first- and both-eye cataract surgery on falls and other injuries in Vietnam

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Aim: Little information exists on the impact of cataract surgery on falls and other injuries in Vietnam. The aim of this study was to determine the impact of first and both eye cataract surgery on the number of falls and other injuries among bilateral cataract patients in Ho Chi Minh City, Vietnam.

Materials and methods: A longitudinal cohort study was conducted involving 413 bilateral cataract patients aged 50+ years. Participants were assessed at three time points: 1 week before, 1–3 months after, and 1 year after first-eye cataract surgery. Visual measures (visual acuity, contrast sensitivity and stereopsis) were taken, and self-reported falls and injury data were collected. A multilevel longitudinal Poisson regression model was used to investigate change in the number of falls after surgery.

Results: The risk of falls decreased by 78% (incidence-rate ratio [IRR] 0.22, 95% confidence interval [CI] 0.06–0.77; *P*=0.018) in the year after cataract surgery for participants who had first-eye surgery only and 83% (IRR 0.17, 95% CI 0.04–0.69; *P*=0.012) for participants who had the second eye operated on compared to before surgery. The risk of falls was three times higher for females than males (IRR 3.13, 95% CI 1.53–6.40; *P*=0.002). Improved binocular contrast sensitivity was also associated with a decrease in falls (IRR 0.40, 95% CI 0.17–0.97; *P*=0.042). The prevalence of other injuries also decreased after cataract surgery.

Conclusion: Cataract surgery reduced the number of falls and other injuries in Vietnam. Contrast sensitivity may be important for ophthalmologists to consider when prioritizing patients for surgery and assessing their fall risk.

Keywords: falls, injuries, cataract surgery, longitudinal, older population, Vietnam

Introduction

More than 420,000 people die each year due to a fall, ranking it the second-most common cause of injury-related mortality worldwide.[1] Approximately 80% of these deaths occur in developing countries, particularly in regions of Southeast Asia and the Western Pacific.[1] Half of all falls result in an injury, 10% of which are serious.[2–4] The older population is the most vulnerable, with the prevalence of falls reported at 35% in those aged 65 years and older, of which 50% may experience a repeat fall within a year.[1,3–5] As well as causing injuries, falls can also lead to a loss of independence, reduced mobility, social isolation, and poor quality of life.[4,6]

Globally, there are approximately 39 million people who are blind and 246 million people with visual impairment, mostly aged 50 years and over.[7] Cataract is the leading cause of visual impairment (33%) in middle- and low-income countries,[7] and approximately 80% of those with untreated cataract live in developing countries.[7,8]

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Cataract surgery is the most common ophthalmic surgical procedure performed worldwide,[9,10] and has been found to bring about significant improvements in visual function, quality of life, daily activities, and depressive symptoms.[6,11,12] However, research is conflicting on whether cataract surgery reduces the risk of falls. Two randomized controlled trials (RCTs) conducted in the UK reported a 34% reduction in fall rate and 40% reduction in risk of recurrent falls after first-eye cataract surgery,[11] but no significant change in falls risk after second-eye surgery.[6] It should be noted that these studies included only women aged over 70 years. A significant reduction in self-reported falls was also found 6 months after cataract surgery among 97 cataract patients.[13] More recently, however, an Australian population-based study reported a significant increase in falls after both first- and second-eye cataract surgery compared to baseline.[14] No information exists on the impact of cataract surgery on falls in developing countries, such as Vietnam, where vision is often much poorer before surgery than in developed countries and there are different cultural and lifestyle factors (such as older people living with their adult children) that may affect fall risk.[15]

Conflicting information also exists regarding the impact of different visual measures on fall risk for cataract patients.[16,17] Several studies have reported that poor visual acuity increases the risk of falls.[18–22] However, recent research in developed countries has found that reduced contrast sensitivity and stereopsis are also important visual risk factors for falls.[17,19,23–25]

Currently, there is little information on the impact of cataract surgery on other types of injuries. A Canadian-based retrospective case-control study found that cataract patients had a higher risk of such injuries as burns, fractures, contusions, lacerations, and sprains compared with controls before cataract surgery, but their risk decreased to that of controls following cataract surgery.[26] This study also showed that the risk of an injury (including falls) increased by 3% per week of waiting for cataract surgery.[26]

Vietnam is a developing country with a population of 86 million people, and 17% are aged 50 years and older.[27] Cataract accounts for 65% of visual impairment[28] in Vietnam, and approximately 120,000 cataract surgeries are performed every year.[28] The incidence rate for injuries in Vietnam is 76/1,000 person-years in the general population, and the incidence rate for falls is estimated at 32/1,000 person-years for those aged 60 years and over.[29] To date, there has been no information on the impact of cataract surgery on falls and other injuries in Vietnam. Therefore, the aim of this study was to assess the impact of first- and both-eye cataract surgery on the number of falls and other injuries in a cohort of bilateral cataract patients in Ho Chi Minh City, Vietnam.

Materials and methods

Study design and participants

A longitudinal prospective cohort study was conducted on patients with bilateral cataract who were scheduled for cataract surgery at the Eye Hospital in Ho Chi Minh City, Vietnam between July 2011 and July 2013. Inclusion criteria included a diagnosis of age-related bilateral cataract, scheduled to undergo first-eye surgery, aged 50 years or older, and living independently in the community. Exclusion criteria included previous surgery for cataract, injury- or diabetes-related cataract, a diagnosis of glaucoma or any other significant ocular diseases, a diagnosis of dementia, Parkinson's disease, schizophrenia, or being wheelchair-bound.

All cataract surgeries were undertaken by phacoemulsification and performed one eye at a time. Patients were screened for ocular comorbidities prior to surgery. Dilated funduscopy was performed by an ophthalmologist during consultation. When funduscopy was not feasible due to dense cataract, postoperative funduscopy was done only if visual outcome was less than 6/12 (0.30 logarithm of minimum angle of resolution [logMAR]) and not improved. This study was approved by the Curtin University Human Research Ethics Committee and the executive board of the Eye Hospital in Ho Chi Minh City in Vietnam.

Data collection

Consecutive bilateral cataract patients were approached by one researcher after examination of their medical records and consultation with their treating ophthalmologist(s) as to their eligibility. They were given a participant-information sheet explaining the purpose of the study, confidentiality, and their right to withdraw from the study at any time without negative impact on their medical treatment. A consent form was signed before any data were collected.

Information was collected at three time points: a week prior to first-eye cataract surgery (baseline), 1–3 months after first/both-eye cataract surgeries (second assessment), and 1 year after each participant's first-eye cataract surgery (third assessment). The outcome of interest was a fall that was defined as "an event which results in a person coming to rest inadvertently on the ground or floor or other lower level".[30] Information was also collected about other injuries that occurred during the study period.

Questionnaire

Eligible participants were interviewed via a researcher-administered structured questionnaire at each of the three assessments. For the baseline and second assessments, the questionnaire was administered face to face, and the third assessment took place via a telephone interview. The questionnaire was translated into Vietnamese and back-translated into English by two independent translators. Information on the assessment of the test–retest repeatability of this questionnaire has been published elsewhere.[31] Demographic, social, and health information collected at baseline included sex, age, ethnicity, marital status, living situation, education level, employment status, refractive management, use of prescribed medications, and presence of comorbid conditions. Comorbid conditions included hypertension, cancer, stroke, angina, rheumatoid arthritis, kidney disease, hearing loss, alcohol abuse, sleep apnea, hypertension, diabetes, and other chronic conditions. Information on changes to social and health-related circumstances was collected at the second and third assessment. Information was also collected regarding quality of life and depressive symptoms at the baseline and second assessments. These results are reported elsewhere.[32,33]

Self-reported falls and other injury data were collected via the questionnaire, which can be obtained from the author. At baseline, participants were asked how many times they had fallen and landed on the floor or ground in the previous 12 months. At the second and third assessments, they reported how many times they had fallen since their last interview. Participants were also asked to describe any nonfall-related injuries they received, eg, burns, fractures, contusions, sprains, lacerations, or motor vehicle-related injuries.

Objective visual measures

Three objective measures of vision were administered by the researcher at the baseline and second assessments according to the hospital protocols and under the guidance of the hospital's ophthalmologists. As the third assessment was conducted by telephone, no visual tests were performed. However, it was expected that there would be minimal change in vision since the second assessment. Visual measures examined included visual acuity, contrast sensitivity, and stereopsis.

Participants wore their current corrective lenses for visual testing. Visual acuity (better eye, worse eye, and binocular with current lens correction) was measured using a Snellen chart provided by the Eye Hospital, calibrated at a 5 m distance.[34,35] Scores were expressed on a logMAR scale. Contrast sensitivity (better eye, worse eye, and binocular with current lens correction) was measured using a Pelli–Robson chart and measured in log units.[36] Due to correlation between measures, only binocular measures of visual acuity and contrast sensitivity were used for this analysis. Stereopsis was assessed by the Titmus Fly StereoTest (Stereo Optical Co. Inc. Chicago, IL, USA),[37] which measured disparity from 1.602 to 3.551 log seconds of arc.

Statistical methods

Descriptive analyses for the cohort were undertaken, and the prevalence of falls and other injuries calculated for the year before and after first-eye surgery. As the number of falls was considered to be count data, a multilevel longitudinal Poisson regression model was undertaken to compare the number of falls during the year before and the year after first-eye cataract surgery. The multilevel Poisson model uses the number of falls as the outcome of interest, but accounts for those who have had more than one fall in the analysis. The longitudinal nature of the observations renders the application of standard Poisson regression analysis inappropriate. Multilevel modeling is appropriate for analyzing clustered and longitudinal data. Failure to account for this may give rise to misleading results including aggregation bias and model misspecification due to lack of independence between measurements at different times.[38,39]

For the multilevel model, the hierarchy was defined as level 1 (the repeated measurements), nested within the level 2 unit (the individual subject). This approach allows for the portioning of variance and covariance between each of the levels. This variation may be accounted for by explanatory variables. Multilevel modeling also allows for the use of unbalanced data.

Each variable was added to the base model as a fixed effect to explain fall variation between individuals and the change in falls within each person over time. Explanatory variables included in the model at level 2 were age, sex, education level, marital status, living situation (alone: no/yes), ethnicity, taking prescription medications (no/yes), comorbid medical conditions including other eye conditions (no/yes), binocular visual acuity, binocular contrast sensitivity, and stereopsis. Refractive management was not included in the model, due to the large number of missing values. Another three-level variable was added to specify whether a participant had first-eye cataract surgery only or both eyes operated on during the 1-year follow-up period compared to before cataract surgery. The test for linear hypothesis after model estimation was undertaken to see if there was a statistical difference between the number of falls after first-eye compared to the number of falls after second-eye surgery.

Unfortunately, the sample size was too small to undertake multivariate modeling for nonfall-related injuries. All analyses were performed using Stata 12 (StataCorp, College Station, TX, USA) at the 5% significance level.

Results

A total of 434 patients with bilateral cataract were approached by the researcher, of whom eleven patients refused to participate and ten were ineligible. The sample at baseline was 413 patients. A total of 247 participants completed the second assessment (dropout rate 40.2%), and 312 completed the third assessment (telephone interview), with 238 completing all three assessments. Of the 312 cataract patients who completed the third assessment, 119 had first-eye surgery only and 193 had both eyes operated on by the 12-month telephone follow-up. There were no statistically significant differences between those who did and did not complete all three assessments in terms of sex (P=0.18), age (P=0.09), and other variables.

Table 1 presents the demographic characteristics of the cohort. At baseline, the mean age of the 413 participants was 66.6 years (standard deviation [SD] 7.9), ranging from 50 to 88 years. The majority of participants were female (n=268, 64.9%), aged between 60 and 69 years (n=170, 41.2%), were married (n=239, 57.8%), were of Kinh ethnicity (n=401, 97.1%), lived with family (n=383, 92.7%), had junior high school level education (n=303, 73.4%), did not take any prescription medications (n=250, 60.5%), and reported at least one comorbidity (n=268, 64.9%). Demographic characteristics of the participants who completed the second and third assessments were very similar (Table 1).

Table 2 presents participants' visual characteristics before and after cataract surgery. Mean binocular visual acuity was 0.62 logMAR (SD 0.41) before surgery for the baseline cohort of 413 participants. After surgery, visual acuity improved to 0.09 logMAR (SD 0.19) for the 247 participants who completed the second assessment. A change of 0.1 logMAR units is commonly considered to be clinically meaningful.[40]

Mean binocular contrast sensitivity was 1.10 log units (SD 0.45) before surgery (n=413), and improved to 1.78 log units

Table 1 Demographic characteristics of bilateral cataract patients before, 1–3 months after, and 1 year after cataract surgery by fall status, Ho Chi Minh City, Vietnam

Variables	Baseline (n=413)				Second assessment (n=247)				Third assessment (n=312)			
	Fall (n=53)		No fall (n=360)		Fall (n=4)		No fall (n=243)		Fall (n=22)		No fall (n=290)	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Female	46	86.8	222	61.7	4	100	151	62.1	13	59.1	185	63.8
Male	7	13.2	138	38.3	0	0	92	37.9	9	40.9	105	36.2
Age (years)												
50–59	11	20.8	75	20.8	0	0	58	23.9	5	22.7	54	15.6
60–69	19	35.9	151	41.9	3	75.0	99	40.7	7	31.8	107	36.9
70+	23	43.4	134	37.2	1	25.0	86	35.4	10	45.5	129	44.5
Marital status												
Married	26	49.1	213	59.2	3	75.0	147	60.5	11	50.0	136	46.9
Single/widowed/divorced	27	50.9	147	40.8	1	25.0	96	39.5	11	50.0	154	53.1
Ethnicity												
Kinh	50	94.3	351	97.5	4	100	234	96.3	21	95.5	282	97.2
Other	3	3.7	9	2.5	0	0	9	3.7	1	4.6	8	2.8
Lives alone												
No	46	86.8	337	93.6	4	100	229	94.2	22	100	277	95.5
Yes	7	13.2	23	6.4	0	0	14	5.8	0	0	13	4.5
Education												
Junior high school	44	83.0	259	71.9	3	75.0	175	72.0	18	81.8	226	77.9
Senior high school	9	17.0	101	28.1	1	25.0	68	28.0	4	18.2	64	22.1
Prescription medication												
No	33	62.3	217	60.3	0	0	145	59.7	12	54.6	178	61.4
Yes	20	37.7	143	39.7	4	100	98	40.3	10	45.5	112	38.6
Comorbid condition												
No	23	43.4	122	33.9	0	0	96	39.5	2	9.1	116	40.0
Yes	30	56.6	238	66.1	4	100	147	60.5	20	90.9	174	60.0

Table 2 Mean visual scores of bilateral cataract patients before and 1–3 months after cataract surgery, Ho Chi Minh City, Vietnam

	Baseline (n=413)	Second assessment (n=247)	*P*-value
	Mean (SD)	Mean (SD)	
Binocular visual acuity (logMAR units)[a]	0.62 (0.41)	0.09 (0.19)	<0.01[c]
Binocular contrast sensitivity (log units)[b]	1.10 (0.45)	1.78 (0.26)	<0.01[c]
Stereopsis (log seconds of arc)[a]	2.78 (0.71)	2.14 (0.53)	<0.01[c]

Notes: [a]Lower scores represent better vision; [b]higher scores represent better vision; [c]paired *t*-test.
Abbreviations: SD, standard deviation; logMAR, logarithm of the minimum angle of resolution.

(SD 0.26) after surgery (n=247). A change of 0.3 log units or one line on the chart is considered to be clinically meaningful.[41] Before surgery, mean stereopsis was 2.78 log seconds of arc (SD 0.71, n=413), and improved to 2.14 log seconds of arc (SD 0.53) after surgery. A change in stereopsis of 0.3 log seconds of arc is often defined as clinically meaningful.[42]

The prevalence of falls was 12.8% (53 of 413) in the year before first-eye cataract surgery. Forty-seven participants fell once, five fell twice, and one fell three times. Only four participants experienced a total of four falls between the baseline assessment and the second assessment. In the year after first-eye cataract surgery, the prevalence of falls was 10.9% (13 of 119) among those who had first-eye surgery only and 6.7% (13 of 193) among those who had both eyes operated on during the follow-up period. Only two participants fell more than once after surgery.

The prevalence of nonfall-related injuries was 5.6% (23 of 413) in the year before first-eye cataract surgery. Of the 23 injuries reported at baseline, 17 (73.9%) were due to motor vehicle crashes, three (13.0%) were burns, two (8.7%) contusions, and one (4.4%) sprain. In the year after first-eye cataract surgery, the prevalence of injuries was 3.4% (four of 119) among those who had first-eye surgery only, and 4.7% (nine of 193) among those who had both eyes operated on during the follow-up period. Of the 14 injuries involving 13 participants after surgery, four (28.6%) were due to motor vehicle crashes, four (28.6%) were contusions, four (28.6%) burns, and two (14.3%) fractures.

The results of the multilevel longitudinal Poisson regression model examining change in the number of falls after cataract surgery are presented in Table 3. After adjusting for potential confounding variables, the risk of falls decreased by 78% (incidence-rate ratio [IRR] 0.22, 95% confidence interval [CI] 0.06–0.77; *P*=0.018) in the year after cataract surgery for participants who had first-eye surgery only, and 83% (IRR 0.17, 95% CI 0.04–0.69; *P*=0.01) for participants who had both eyes operated on, compared to the year before surgery. The risk of falls was three times higher for females than males (IRR 3.13, 95% CI 1.53–6.40; *P*=0.002). In addition, for every 1-log unit increase (improvement) in binocular contrast sensitivity, the risk of falls decreased by 60% (IRR 0.40, 95% CI 0.17–0.97; *P*=0.04). There was no association between age, binocular visual acuity, stereopsis, education level, ethnicity, marital status, living situation, medication use, or comorbid conditions and risk of falls. An examination of the difference in the number of falls after first eye surgery and after second eye surgery revealed no significant difference (*P*=0.6337).

Discussion

This is the first longitudinal study to assess the impact of first- and both-eye cataract surgery on the number of falls and injuries in Vietnam. The study found a significant decrease in the number of falls 1 year after surgery of 78% for bilateral cataract patients who had first-eye surgery only and 83% for those who had both eyes operated on compared to the year before surgery.

The prevalence of falls was lower than previously reported in studies from developed countries, despite poor vision.[11] However, a systematic review of 21 studies conducted in Asian countries reported the incidence of falls to be approximately half that of Caucasian populations, with a median of 18%.[43] It should be noted that the participants in these studies were older than in the current study. While the reasons behind the lower prevalence of falls in the current study require further investigation, possible explanations include the younger age of participants, social environment and customs (adult children living with and caring for their older parents), better lower-limb strength, fewer high-risk behaviors, and differing activity patterns that reduce exposure to falls.[43] It is also possible that the lower prevalence reported could be due to underreporting of falls and recall bias in the study questionnaire. The prevalence of nonfall-related injuries was small among this Vietnamese cohort, but also decreased following surgery. Unfortunately, the sample size

Table 3 Multilevel longitudinal Poisson regression of the number of falls 1 year before and after first-eye cataract surgery, Ho Chi Minh City, Vietnam

	IRR	95% CI	*P*-value
Cataract surgery			
Before surgery	1		
After first eye surgery	0.22	0.06–0.77	0.018*
After both surgeries	0.17	0.04–0.69	0.012*
Sex			
Male	1		
Female	3.13	1.53–6.40	0.002*
Age (years)	1.02	0.98–1.05	0.366
Binocular contrast sensitivity (log units)	0.40	0.17–0.97	0.042*
Binocular visual acuity (logMar)	1.04	0.45–2.42	0.930
Stereopsis (log units)	1.01	0.66–1.54	0.972
Education			
Junior high school	1		
Senior high school	0.73	0.36–1.45	0.363
Ethnicity			
Kinh	1		
Other	2.10	0.60–7.36	0.245
Marital status			
Single/divorced/separated	1		
Married	1.57	0.87–2.84	0.133
Lives alone			
No	1		
Yes	2.45	0.98–6.29	0.055
Uses medication			
No	1		
Yes	1.15	0.61–2.18	0.659
Comorbidity			
No	1		
Yes	0.79	0.41–1.53	0.491
Random part	**Estimate**	**95% CI**	
Repeated-measure variance	0.71	0.37–1.37	
Patient-level variance	0.65	0.31–1.35	
Covariance of time and the constant	1	−1 to 1	
Log likelihood	−249.75		

Note: *Significant at $P<0.05$.
Abbreviations: IRR, incident-rate ratio; CI, confidence interval; logMAR, logarithm of the minimum angle of resolution.

was not large enough to undertake multivariate modeling for nonfall-related injuries.

Previous research has produced conflicting results on the impact of cataract surgery on falls. An RCT of expedited versus routine cataract surgery undertaken in the UK found that first-eye cataract surgery reduced the number of falls;[11] however, it found no benefit for expedited second-eye cataract surgery in women aged over 70 years.[6] A study by Brannan et al found that cataract surgery reduced the risk of falls;[13] however, the sample size of this study was small, and only assessed the change in falls 6 months before and 6 months after surgery. Moreover, it was not specified whether the participants in this study had first- or second-eye cataract surgery. In contrast, a retrospective population-based study using administrative health-linked data found that the rate of hospital admissions due to a fall increased 1 year after surgery compared to the year before.[14] However, the study was not able to control for possible confounders, including visual measurements, and only examined more severe falls. In contrast, a prospective study found that cataract surgery had no impact on falls for an independently living older population.[44] However, participants who had one- and both-eye cataract surgery were combined for the analysis and the sample size was small (n=122).

The current study suggests that in Vietnam, even among a younger cohort than the UK-based RCTs, cataract surgery has significant benefits for fall prevention. The findings also suggest that for bilateral cataract patients, second-eye cataract surgery provides additional fall-prevention benefits compared to the period before surgery.

However, the difference in the number of falls between first- and second-eye surgery was not statistically significant. The participants of this study had considerably poorer presurgery vision than participants of the studies described earlier, which were conducted in developed countries.[11,13,44] This may have contributed to the significant reduction in falls found among this Vietnamese cohort after surgery.

This study found that the risk of falls was over three times higher for Vietnamese females than males. This elevated risk for females is consistent with previous research,[45] which found that women are more likely to live on their own, possibly explaining the increased risk. The use of high-heel footwear, psychotropic drug use, and physical activity levels among women may also affect their risk for a fall; however, this information was not captured in this study.[45,46] Age, comorbid conditions, and medication use have been widely reported to increase the risk of falls, but were not significantly associated with falls in the current study. This may be due to the younger age of our cohort who were aged 50+ years, with less than 1% aged 85 or older. This much older age-group has previously been found to be at a particularly elevated risk for falls.[3,5,45] In addition, 65% reported a comorbid condition, and less than 40% used prescription medications at baseline. The lack of association between these variables and falls may also be due to the overall small number of falls recorded in this study.

While some previous studies have only used visual acuity when assessing the level of visual impairment, this study assessed binocular visual acuity, binocular contrast sensitivity, and stereopsis. However, only improved binocular contrast sensitivity after surgery was found to be associated with a decrease in falls. Although visual acuity is the most commonly used measure for assessing disability caused by cataract and prioritizing patients for surgery, this finding supports a growing pool of research that suggests contrast sensitivity may be a more important measure of fall risk than visual acuity.[23–25] Interestingly, the current study also found no association between stereopsis and fall risk. While good evidence exists that poor stereopsis increases the risk of falls among the general older population,[17] this association may not have been observed in the current study because cataract causes more impairment to contrast sensitivity than stereopsis. It should also be noted that anisometropia (a condition in which the two eyes have unequal refractive power) may have been present in participants in this study while they waited for their second-eye surgery. This difference between eyes can affect binocular vision, and may have more effect on fall risk than stereopsis. Further research is warranted.

This study has limitations. Firstly, fall and injury data were self-reported, and may have been affected by recall bias.[47] The gold standard for collection of fall data involves fall diaries with frequent reporting intervals. Therefore, while the results of this study provide preliminary information on the impact of cataract surgery on falls in Vietnam, further research using more precise methods should be undertaken. In addition, the interviewer was not masked to the operative status of the patients, which may have introduced bias. While every attempt was made to confirm a fall with family members and relatives, this may have resulted in an underestimate of the number of falls. Moreover, we were not able to collect the exact date of the fall at the 1-year follow-up assessment, because the majority of the population could not recall the date. This study did not collect information on other medical interventions or lifestyle changes that may account for a change in fall risk in the 12 months after cataract surgery either. Also, we did not assess visual function at the 1-year follow-up assessment. It is possible that some people may have experienced a change in their visual function after the second assessment. A cognitive assessment was not conducted, and cognitive ability is a well-known confounder in research with an older population.[44,48–52] A large number of participants (40%) were unable to return to the hospital to complete the second assessment, which may have increased the apparent effectiveness of cataract surgery. Refractive management, which is an important risk factor for a fall, was not included in the analysis either. A final limitation was the lack of a suitable comparison group to compare changes in falls. Nevertheless, the before-and-after nature of the study design, which used the same person as their own control, would have controlled for other interindividual differences that can confound studies.

In conclusion, this study provides preliminary evidence that first- and both-eye cataract surgery significantly reduce the number of falls and injuries in a Vietnamese population. These findings have implications for ophthalmologists and other health professionals, as they highlight the importance of cataract surgery for reducing the risk of falls and other injuries and the need to incorporate the contrast sensitivity measure when prioritizing patients for surgery and assessing their risk of falls. The contrast sensitivity measure may also allow health professionals to identify patients who would most benefit from other fall-prevention interventions.

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Disclosure

The authors report no conflicts of interest in this work.

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CHAPTER 9: DISCUSSION, RECOMMENDATIONS AND CONCLUSION

This chapter discusses the research findings, as well as its strengths and limitations. The chapter also provides a conclusion and recommendations for further research.

This is the first longitudinal study to investigate the impact of cataract surgery on health outcomes including falls and other injuries, VRQOL, and depression in Vietnam. It has provided evidence-based information that may guide policy makers, ophthalmologists, and health professionals regarding falls prevention programs and future interventions to improve quality of life for an older population with cataract in Vietnam.

9.1. Falls and injuries

9.1.1. Prevalence of falls and injuries

The study found that the prevalence of falls in the year before first-eye cataract surgery was 13%. Of those who reported a fall, 8% required hospitalisation. While the prevalence of falls, despite poorer vision[14], was lower than previously reported in developed countries, the percentage requiring hospitalisation was higher[24, 112, 220] and warrants further investigation. Reasons for lower prevalence of less severe injury and falls in the current study include the younger age of participants, social environment and customs (adult children living with and caring for their older parents), better lower-limb strength, fewer high-risk behaviours, and differing activity patterns that reduce exposure to falls[203]. It is also possible that the lower prevalence reported could be due to underreporting of falls due to recall bias in the study.

The prevalence of nonfall-related injuries was also low among this Vietnamese cohort, but did significantly decrease following first and second-eye surgery.

9.1.2. Risk factors for falls

When examining risk factors for a fall in the previous year, contrast sensitivity was the only visual measure significantly associated with falling among bilateral cataract patients in Vietnam, after controlling for confounding factors and other visual measures. The risk of a fall decreased as contrast sensitivity improved which is consistent with previous research[115, 119, 125]. Contrast sensitivity frequently declines as a result of cataract[74]. It is important for detecting and discriminating objects in the environment, using stairs and is particularly important for activities performed in dim light[94, 126, 127].

Neither visual acuity or stereopsis were independently associated with the risk of falls in the previous twelve months despite the fact that participants in this study had much poorer visual acuity and stereopsis than cataract patients in studies from developed countries[14, 91]. A recent systematic review of risk factors for falls among older adults concluded that there is evidence for a link between stereopsis and falls[120]. This may suggest that while stereopsis is an important risk factor for falls in the general older population, for those with cataract, decreased contrast sensitivity may be the most important visual risk factor.

The majority of the cohort who reported a fall were women and this finding is consistent with previous research[110]. It is possible that the high incidence of falls among women may be due to other health conditions such as osteoporosis. Research suggests that approximately 40% of postmenopausal women will have some type of osteoporotic fracture during their lifetime[221, 222]. Other reasons for this may be the use of high-heel footwear, psychotropic drug use, and physical activity levels among women which may affect their

risk of fall; however, this information was not captured in this study[110, 223]. Age, co-morbid conditions and medication use have been widely reported to increase the risk of falls[109, 111], but were not significantly associated with falls in the current study, despite 65% reporting a co-morbid condition and approximately 40% taking prescribed medications. Surprisingly, this study did not find a significant relationship between age and falls which is not consistent with previous studies[110]. This may be due to the younger age of our cohort who were aged 50 plus years, with less than 1% aged 85 or older. This older age-group has previously been found to be at a particularly elevated risk for falls[12, 110, 111].

The results of this study also support previous findings that a person who lives alone is at an increased risk of a fall compared to those who live with others[110, 224]. In the Vietnamese culture, different generations live together in one house and children take care of their parents. It is possible that cataract patients who live with their adult children may be restricted from doing heavy jobs around the house, thereby limiting their opportunity to fall. Other possible explanations for this finding may be that older people living alone may have higher poverty levels, lower social support, undertake less physical activity and have less assistance in the event of a fall than those who live with others[224].

9.1.3. Impact of first and second-eye cataract surgery on falls

When examining the longitudinal impact of first and second-eye cataract surgery on the number of falls, the study found that falls significantly decreased by 78% in patients who had first-eye surgery only, and 83% in patients who had both-eye surgeries one year after surgery. However, the difference in the number of falls between first and second-eye surgery was not statistically significant. The participants in this study had considerably poorer pre-surgery vision than studies which were conducted in developed

countries[14, 17, 91] and may have contributed to the significant reduction in falls found among this Vietnamese cohort after cataract surgery.

Previous research has produced conflicting results on the impact of first and second-eye cataract surgery on falls. A RCT of expedited versus routine cataract surgery undertaken in the UK found that first-eye cataract surgery reduced the number of falls[14]; however, it found no benefit for expedited second-eye cataract surgery in women aged over 70 years[28]. A study by Brannan et al found that cataract surgery reduced the risk of falls[17]; however, the sample size of this study was small, and only assessed the change in falls six months before and six months after surgery. Moreover, it was not specified whether the participants in this study had first or second-eye cataract surgery. In contrast, a retrospective population-based study using administrative health-linked data found that the rate of hospital admissions due to a fall increased one year after first and second-eye surgery compared to the year before[24]. However, the study was not able to assess the severity of visual impairment in the cohort, and only examined falls that required hospitalization. In contrast, a prospective study found that cataract surgery had no impact on falls for an older population living independently in the community[91].

Similar to the findings of the retrospective study, the longitudinal study found that the risk of falls for first or second-eye cataract surgery was over three times higher for Vietnamese females than males. Age, co-morbid conditions and medication use have been widely reported to increase the risk of falls[109, 111], but again, were not significantly associated with falls in the longitudinal analysis. The lack of association between these variables and falls may also be due to the overall small number of falls recorded in this study.

Only improved binocular contrast sensitivity after first and second-eye surgery was found to be associated with a decrease in falls. Although visual

acuity is the most commonly used measure for assessing disability caused by cataract and prioritizing patients for surgery, this finding supports a growing pool of research that suggests contrast sensitivity may be a more important measure of fall risk than visual acuity for cataract patients[115, 119, 125]. Interestingly, the current study also found no association between stereopsis and fall risk, despite good evidence existing that poor stereopsis increases the risk of falls among the general older population[120]. It should also be noted that anisometropia (a condition in which the two eyes have unequal refractive power) may have been present in participants in this study while they waited for their second-eye surgery. This difference between eyes can affect binocular vision, and may have more effect on fall risk than stereopsis.

9.2. Vision-related quality of life (VRQOL)

9.2.1. Impact of first and second-eye cataract surgery on VRQOL

This study found that there was a significant improvement in VRQOL after both first and second-eye cataract surgery. These results are consistent with previous research examining change in NEI VFQ-25 scores after cataract surgery in Japan and the USA[26, 81]. A strength of the NEI VFQ-25 questionnaire is that it was pilot tested on a Vietnamese cohort of 30 patients. Prior to its administration, the NEI VFQ-25 not only measures difficulty with visual tasks but also the influence of visual impairment on social functioning, mental health, role difficulties and dependency[150]. While large improvements were seen in subscales such as general vision and near activities, they were also seen in the vision specific mental health and role difficulties subscales for those who had first-eye surgery and surgery in both eyes. This provides preliminary evidence that cataract surgery may have benefits not only for daily activities of living but also have social and mental health benefits.

The results also confirmed that while bilateral cataract patients who had only first-eye surgery experienced improvement in VRQOL, those who had both

eyes operated on experienced a significantly greater improvement in VRQOL score. They also scored better on each of the subscales after surgery, compared to those who had first-eye surgery only. This finding highlights the importance of recommending second-eye surgery to bilateral cataract patients.

9.2.2. Visual measures associated with improvement in VRQOL

Improvement in contrast sensitivity and stereopsis were associated with an improvement in VRQOL after surgery, however visual acuity was not. This finding is consistent with previous research examining VRQOL[225, 226]. Stereopsis is a form of depth perception and is important for near vision and fine motor tasks[226, 227]. Previous research has found that people with poorer stereopsis have reported more difficulty in performing daily activities[226, 228]. This may explain why stereopsis was found to be associated with better VRQOL in this study.

9.3. Depressive symptoms

9.3.1. Prevalence of depressive symptoms

The prevalence of depressive symptoms among this Vietnamese cohort of bilateral cataract patients was found to be 16%. Previous research conducted on an ageing population (60 years and older) in Indonesia, Vietnam, and Japan found the prevalence of depression to be approximately 17%[22]. A separate Vietnamese study on adults aged 55 years or older found the prevalence of depression to be approximately 47%[21] whereas another Vietnamese study found the prevalence of depression to be 24%[229]. However, in these studies, the participants did not have visual impairment.

9.3.2. Impact of first and second-eye cataract surgery on depressive symptoms

This study found a small but significant improvement in depressive symptoms after first and second-eye cataract surgery. However, there was no significant difference in depressive symptoms between those who had first-eye cataract surgery and those who had both eyes operated on. Similarly, a UK-based RCT of older women who underwent first-eye cataract surgery reported a small improvement in depressive symptoms, compared to a no surgery group[14]. However, a second UK-based RCT of older women who underwent second-eye surgery found no difference in depressive symptoms[28]. The results of our study may provide support that first but not second-eye cataract surgery has a small benefit for depressive symptoms. It should be noted that it is possible that a change in depressive symptoms may not yet have occurred for some of the patients if the timing of the follow-up assessment was done in the first month after their cataract surgery.

9.3.3. Factors associated with improvement in depressive symptoms

The study also found that being female was associated with a significant improvement in depressive symptoms after cataract surgery and is consistent with previous studies[90, 199, 201, 207]. It is well known that depression is more prevalent in women than men, including Vietnam[21] and this may have contributed to the gender differences observed in this study.

Surprisingly, while our study found a clinically significant improvement in visual acuity, contrast sensitivity, and stereopsis after first and both-eyes cataract surgeries, these were not significantly associated with an improvement in depressive symptoms. A RCT, conducted in developed country by Datta et al., found that only visual acuity was negatively associated with depression[226].

9.4. Strengths of the study

A strength of this study was the longitudinal nature of the study design which examined the separate impact of first and second-eye cataract surgery on different health outcomes. The study design provided strength for interpreting the results which could not be achieved with a cross-sectional design.

The study also measured visual acuity, contrast sensitivity and stereopsis. Previous studies examining the impact of cataract surgery on the number of falls and injuries, VRQOL and depression have seldom included all three visual measures.

9.5. Limitations of the study

The study has several limitations. First of all, a large number of participants (40%) were unable to return to the hospital to complete the second assessment and may have introduced selection bias in the study. However, there was no statistically significant difference between those who did and did not complete all three assessments in term of sex and age.

Falls and injuries occurring during the previous year and the one year follow-up were self-reported. Consequently, the prevalence of falls might have been underestimated due to recall bias, especially if the fall was not serious. The gold standard for the collection of falls information involves fall diaries with frequent reporting intervals. Further research using more precise methods such as a fall diary should be undertaken in any fall study in Vietnam.

The interviewer was not masked to the operative status of the patients, which may have introduced bias. While every attempt was made to confirm a fall with family members and relatives, this may have resulted in an underestimate of the number of falls. Moreover, we were not able to collect the exact date of the fall at the one-year follow-up assessment, because the majority of the

participants and their family members could not recall the date. Unfortunately we did not ask if the participant hired a care giver after their cataract surgery. This may have impacted on how willing the participant was to answer questions about depression and quality of life in the presence of the care-giver. However the majority of the cohort did live with other family members so any influence may have been minimal.

In addition, cognitive ability was not captured in the study and is a well-known confounder in research with an older population[25, 26, 77, 91, 193, 226]. Moreover, information on functional measurements, lifestyle changes, physical activity, and medical interventions were not collected and are well known risk factors for falls[230]. Prescription medication usage was self-reported, so may also be unreliable. Also, we did not assess visual function at the one-year follow-up assessment. It is possible that some people may have experienced a change in their visual function after the second assessment.

The lack of a comparison group that had cataract, but did not have surgery was another limitation of the study as this would have allowed a comparison of falls prevalence between those with and without cataract. However the before and after study design which used the same person as their own control would have accounted for inter-individual differences that can confound studies using separate control groups.

9.6. Recommendations

With a total population of 86 million people, of which 17% are aged 50 years and older and a rapidly ageing population age-related diseases including age-related cataract, depression, and injuries are projected to dramatically increase in Vietnam. There is an urgent need for evidence on interventions that may reduce falls, injuries and depression among an older Vietnamese population. Findings of this study suggest that cataract surgery has significant falls and

injury prevention benefits as well as benefits for quality of life and depression in Vietnam. The study results indicate that second-eye cataract surgery should be promoted and performed with minimum delay among this population. Also, contrast sensitivity was associated with changes in the number of falls and visual related quality of life after cataract surgery. This calls into question the reliance on visual acuity measures in determining levels of visual impairment and prioritizing cataract patients for surgery. Ophthalmologists should incorporate contrast sensitivity into their assessments to ensure cataract patients who have normal visual acuity but are significantly impaired on the former visual measure are not missed.

Recommendations for further research include

- This study found that the hospital admission rate due to falls was higher than in previous studies. Further research is required to confirm these findings and determine reasons for the higher level of hospitalization in the event of a fall.
- The results of this study did not find stereopsis or visual acuity to be a significant risk factor for a fall despite the fact that a large number of participants were considered legally blind in at least one eye. Further research is needed to confirm this finding.
- The gold standard for the collection of fall information involves fall diaries with frequent reporting intervals. Further research using more precise methods such as a fall diary should be undertaken in any fall study in Vietnam.
- This study found improvements in VRQOL and depressive symptoms after cataract surgery in a short-term period of three months. A further study with a longer follow-up time to assess the impact of bilateral cataract surgery on VRQOL and depressive symptoms is warranted.
- Daily activities of living and physical activity levels, which are well known risk factors for falls, were not captured in this study. They

should be collected in future studies examining the impact of visual impairment on the risk of falls.

- The examination of the impact of cataract surgery on other injuries such as burns, contusions, or lacerations should be undertaken with a larger sample size to allow detection changes between first and second-eye cataract surgery.

9.7. Conclusion

In conclusion, the study found first and second-eye cataract surgery significantly reduced the number of falls and injuries and improved VRQOL and depressive symptoms in Vietnamese patients with bilateral cataract aged 50 years and over. These findings have implications for ophthalmologists and other health professionals, as they highlight the importance of cataract surgery for improved health outcomes and demonstrate the need to incorporate the contrast sensitivity measure when prioritizing patients for cataract surgery and assessing their risk of falls.

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APPENDIX

Appendix 1: Participant Information Sheet

Appendix 2: Informed Consent

Appendix 3: Identification Information

Appendix 4: Questionnaire for the first interview

Appendix 5: Questionnaire for the second interview

Appendix 6: Questionnaire for the third interview

Appendix 7: Ethics approval

Appendix 8: Written statements of contribution

Appendix 1: Participant Information Sheet

PARTICIPANT INFORMATION SHEET

My name is To Gia Kien, I am currently undertaking a study about people who have cataract surgery.

Purpose of Research

I am looking at how it affects your quality of life, if you feel depressed and the number of falls and other injuries that you have before and after your surgery.

Your Role

We will ask you some questions about your vision and health before and after your surgery, and measure your vision one week before your first eye cataract surgery and 1 to 3 months after your cataract surgery. The eye tests are easy to complete. You just have to read some letters off a chart. The eye tests and questions should take about 50 minutes to complete. I will also ask phone one year after your cataract surgery to ask about the number of falls you have had since your surgery. The phone-interview will take 10 minutes.

Consent to Participate

Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without it affecting your treatment.

Confidentiality

The information you provide will be kept separate from your personal details, and I will only have access to this. The questionnaires will not have your name or any other identifying information on it and all information you provide will be kept in a locked cabinet for five years, before it is destroyed.

Further Information

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 68/2011) and the acceptance of the Executive Board of the Eye Hospital in Ho Chi Minh City. The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

If you would like further information about the study, please feel free to contact me on 0919511121 or email: kiengiato@gmail.com.

Thank you very much for your involvement in this research, your participation is greatly appreciated.

BẢNG THÔNG TIN NGHIÊN CỨU

Cháu tên là Tô Gia Kiên, hiện đang nghiên cứu về những người được phẫu thuật đục thủy tinh thể.

Mục đích của nghiên cứu

Cháu đang tìm hiểu xem phẫu thuật ảnh hưởng thế nào đến chất lượng sống, mức độ trầm cảm, số lần té ngã và các chấn thương của cô/bác trước và sau khi cô/bác được phẫu thuật.

Vai trò của cô/bác

Chúng cháu sẽ hỏi một số câu hỏi về thị giác và sức khỏe của cô/bác trước và sau khi phẫu thuật, và đo thị lực của cô/bác một tuần trước khi phẫu thuật mắt thứ nhất và 1 tới 3 tháng sau phẫu thuật. Các bài kiểm tra thị lực rất dễ thực hiện. Cô/bác chỉ cần đọc các ký tự trên bảng. Quá trình đo thị lực và hỏi sẽ mất khoảng 50 phút. Cháu cũng sẽ hỏi cô/bác về số lần té ngã qua điện thoại một năm sau khi cô/bác được phẫu thuật. Cuộc phỏng vấn qua điện thoại sẽ mất khoảng 10 phút.

Đồng ý tham gia

Sự tham gia của cô/bác trong nghiên cứu này là hoàn toàn tự nguyện. Cô/bác có quyền rút khỏi nghiên cứu bất cứ lúc nào mà không ảnh hưởng đến việc điều trị bệnh lý.

Tính bảo mật

Thông tin mà cô/bác cung cấp sẽ được tách khỏi thông tin cá nhân và cháu là người duy nhất được biết. Bộ câu hỏi sẽ không chứa tên hay bất cứ thông tin nhận dạng nào khác và tất cả những thông tin mà cô/bác cung cấp sẽ được khóa trong tủ trong vòng năm năm trước khi được tiêu hủy.

Cần biết thêm thông tin

Nghiên cứu này đã được Hội đồng Y đức của Đại học tổng hợp Curtin thông qua (Số chấp nhận HR 68/2011) và đã được sự đồng ý của Ban Giám Đốc Bệnh Viện Mắt Tp.HCM. Hội đồng Y đức gồm các thành viên trong cộng đồng, giảng viên, luật sư, bác sĩ và các chức sắc tôn giáo. Vai trò chính là bảo vệ những người tham gia. Nếu cần xác nhận thông tin gì, xin hãy gởi thư về địa chỉ: Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 hoặc điện thoại số: 92662784 hoặc email: hrec@curtin.edu.au.

Nếu cần thêm thông tin gì về nghiên cứu, xin vui lòng liên hệ với anh Kiên qua số di động 0919511121 hoặc email: kiengiato@gmail.com.

Cảm ơn cô/bác đã tham gia vào nghiên cứu này, chúng cháu trân trọng sự tham gia của cô/bác.

Appendix 2: Informed Consent

INFORMED CONSENT

Impact of bilateral cataract surgery on quality of life, depression, falls, and other injuries: a prospective study in Vietnam.

I have been fully informed about the purpose and procedures of the study. I have been provided with the participant information sheet. Any questions I have asked have been answered to my satisfaction.

I understand that I have the right to withdraw my participation from the study at any time without any impact on my medical treatment.

I understand that all information provided is treated as confidential.

I agree that research gathered for this study may be published provided names or any other information that may identify me is not used.

I agree to participate in the study as outlined to me:

Signature _____

Name _____

Date _____

Investigator

Signature _____

Name _____

BẢNG CAM KẾT

Tác động của phẫu thuật đục thủy tinh thể hai mắt lên chất lượng sống, trầm cảm, té ngã và chấn thương: Một nghiên cứu tiền cứu tại Việt Nam.

Tôi đã được thông tin đầy đủ về mục đích của nghiên cứu này. Tôi đã nhận được bảng thông tin nghiên cứu. Mọi câu hỏi của tôi đã được trả lời thỏa đáng.

Tôi hiểu rằng tôi có quyền rút khỏi nghiên cứu này bất cứ lúc nào mà không ảnh hưởng tới việc điều trị bệnh lý của tôi.

Tôi hiểu rằng tất cả những thông tin mà tôi cung cấp đều được bảo mật.

Tôi đồng ý rằng tất cả những dữ kiện của nghiên cứu này nếu được xuất bản sẽ không chứa bất cứ thông tin nào mà có thể nhận dạng được tôi.

Tôi đồng ý tham gia nghiên cứu này

Chữ ký _____

Họ và tên _____

Ngày _____

Điều tra viên

Chữ ký _____

Họ và tên _____

Appendix 3: Identification Information

☐.☐☐☐

IDENTIFICATION INFORMATION					
I1	Date of completion the questionnaire (dd/mm/yy)	☐☐.☐☐.☐☐☐☐			
Personal details of participant					
I2	Name of participant				
I3	Address (number and street, ward, district, province/city)				
I4	Home phone				
I5	Cell phone				
I6	Gender	Male	1		☐
		Female	2		
I7	Date of birth ≤ 01/01/1961 (dd/mm/yy)	☐☐.☐☐.☐☐☐☐			

Inclusive criteria	Exclusive criteria
☐ Bilateral cataract ☐ First eye will be operated within a week of interview date ☐ Second eye cataract surgery will be done within a month of the first ☐ First and second-eye surgery will be operated using phaco-emulsification ☐ Living independently in the community ☐ Can read Vietnamese alphabetical letter	☐ Diabetes-related cataract ☐ Injury-related cataract ☐ Diabetes ☐ Wheelchair bound ☐ Delirium ☐ Dementia or Alzheimer's Disease ☐ Schizophrenia ☐ Parkinson's Disease ☐ Glaucoma ☐ Eye infectious diseasess ☐ Other significant ocular diseases ☐ Damaged optic nerves ☐ Corneal scar

Consent form

☐ Consent form has been read out to the respondent

☐ Signed consent form has been obtained

□.□□□

THÔNG TIN NHẬN DẠNG					
I1	Ngày hoàn thành bộ câu hỏi (dd/mm/yy)	□□.□□.□□□□			
Chi tiết cá nhân của người tham gia					
I2	Tên người tham gia				
I3	Địa chỉ người tham gia (Số nhà, tên đường, phường/xã, quận/huyện, tỉnh/TP)				
I4	Số điện thoại				
I5	Di động				
I6	Giới tính	Nam	1		□
		Nữ	2		
I7	Ngày tháng năm sinh? ≤ 01/01/1961 (dd/mm/yy)	□□.□□.□□□□			

Tiêu chuẩn chọn vào	Tiêu chuẩn loại ra
□ Đục thủy tinh thể (cataract, cườm khô) hai mắt □ Mắt thứ nhất sẽ được phẫu thuật trong vòng 1 tuần kể từ ngày phỏng vấn □ Phẫu thuật mắt thứ 2 cách phẫu thuật mắt thứ 1 tối đa hai tháng □ Cả hai mắt sẽ được phẫu thuật bằng phương pháp Phaco □ Sống tự do trong cộng đồng □ Đọc được bảng chữ cái tiếng Việt	□ Đục thủy tinh thể do tiểu đường □ Đục thủy tinh thể do chấn thương □ Bệnh tiểu đường □ Ngồi xe lăng □ Mê sảng □ Mất trí nhớ, bệnh Alzheimer (bệnh mất trí do tế bào não suy thoái) □ Tâm thần phân liệt □ Bệnh Parkinson (bệnh liệt rung) □ Bệnh tăng nhãn áp (glaucoma, cườm ướt) □ Các bệnh nhiễm khuẩn ở mắt □ Các bệnh về mắt nghiêm trọng khác □ Tổn thương thần kinh thị giác □ Sẹo giác mạc

Bảng cam kết phỏng vấn (consent form)
□ Đã đọc consent form cho đối tượng tham gia nghe □ Đối tượng tham gia đã ký consent form

Appendix 4: Questionnaire for the first interview

□.□□□

GENERAL INFORMATION					
First, we would like to ask you some general information					
A1	Are you?	Single	1		□
		Married/De facto	2		
		Widow	3		
		Divorced/Seperated	4		
A2	Who do you live alone? (MULTI-CHOICE QUESTION)	Alone	1	→ A4	□
			2		
		Husband/Wife	1		□
			2		
		Children	1		□
			2		
		Other	1		□
			2		
A3	How many people do you live with in your home?	People □□			
A4	What is the highest level of education you have completed?	Did not attend school	1		□
		Can read and write	2		
		Primary school	3		
		Junior high school	4		
		Senior high school	5		
		Vocational school	6		
		University degree	7		
A5	What is your occupation	Retire/old/cannot work	1		□
		Housewife	2		
		Bussinness/self-employed	3		
		Office worker	4		
		Worker	5		
		Motorbike taxi rider	6		
		Taxi driver	7		
		Free-occupation (bricklayer, hired man, farmer,...)	8		
		Other (please specify)	9		
A6	On average, how much money did your household earn per month? (million)	□□□.□			
A7	What is your ethnic back ground?	Kinh	1		□
		Hoa	2		
		Khome	3		
		Other (please specify)	4		
A8	What is your religion?	No religion	1		□
		Buddhist	2		
		Catholic	3		
		Other (please specify)	4		

□.□□□

MORBIDITY					
B1	Are you taking any prescription drugs (drugs that a doctor has told you to take) at the present time?	Yes	1		□
		No	2	→ B3	
B2	If yes, please specify the drugs				
B3	Are you taking any drugs that are available over the counter (without a doctor's prescription) from a pharmacy (chemist) at the present time?	Yes	1		□
		No	2	→ B5	
B4	If yes, please specify the drugs				
Do you currently have a confirmed diagnosis from your general doctor for following medical conditions?					
B5	Cancer	Yes	1		□
		No	2		
B6	Heart diseases	Yes	1		□
		No	2		
B7	Angina	Yes	1		□
		No	2		
B8	Stroke	Yes	1		□
		No	2		
B9	Hypertension	Yes	1		□
		No	2		
B10	Rheumatoid arthritis	Yes	1		□
		No	2		
B11	Osteoarthritis	Yes	1		□
		No	2		
B12	Kidney disease	Yes	1		□
		No	2		
B13	Epilepsy	Yes	1		□
		No	2		
B14	Hearing impairment	Yes	1		□
		No	2		
B15	Sleep apnoea	Yes	1		□
		No	2		
B16	Asthma	Yes	1		□
		No	2		
B17	Alohol abuse or dependence	Yes	1		□
		No	2		
B18	High blood cholesterol	Yes	1		□
		No	2		
B19	Other (please specify)				

□.□□□

FALLS AND OTHER INJURIES										
READ: We are going to ask you some questions about your fall and injury status, please think about your situation in the past 12 months.										
F1	**During the past 12 months**, have you fallen and landed on the floor or ground? *A fall will be defined "as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level"*						Yes	1		□
							No	2	→ F3	
F2	**If yes,** how many times have you fallen?									□□
For each fall, did you require hospitalisation or other medical attention										
	Fall number	Require hospitalisation		Required medical attention		Cause of fall	Injurious position		What were you doing at the time of fall	
		Yes	No	Yes	No					
F2a	1	□	□	□	□					
F2b	2	□	□	□	□					
F2c	3	□	□	□	□					
F2d	4	□	□	□	□					
F2e	5	□	□	□	□					
F3	**During the past 12 months**, did you have any other injuries that were not related to fall (for example burn, fracture, contusion, sprain, lacerations, etc...)?						Yes	1		□
							No	2	→ M1	
F4	**If yes,** how many other injuries did you have?									□□
For each injury, did you require hospitalisation or other medical attention										
	Injury number	Require hospitalisation		Required medical attention		Cause of injury	Injurious position		What were you doing at the time of injury	
		Yes	No	Yes	No					
F4a	1	□	□	□	□					
F4b	2	□	□	□	□					
F4c	3	□	□	□	□					
F4d	4	□	□	□	□					
F4e	5	□	□	□	□					

□.□□□

DEPRESSION						
READ: Next is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the past week						
During the past week		< 1 day	1-2 days	3-4 days	5-7 days	
M1	I was bothered by things that usually don't bother me	0	1	2	3	□
M2	I did not feel like eating; my appetite was poor	0	1	2	3	□
M3	I felt that I could not shake off the blues even with help from my family	0	1	2	3	□
M4	I felt that I was just as good as other people	0	1	2	3	□
M5	I had trouble keeping my mind on what I was doing	0	1	2	3	□
M6	I felt depressed	0	1	2	3	□
M7	I felt that everything I did was an effort	0	1	2	3	□
M8	I felt hopeful about the future	0	1	2	3	□
M9	I thought my life had been a failure	0	1	2	3	□
M10	I felt fearful	0	1	2	3	□
M11	My sleep was restless	0	1	2	3	□
M12	I was happy	0	1	2	3	□
M13	I talked less than usual	0	1	2	3	□
M14	I felt lonely	0	1	2	3	□
M15	People were unfriendly	0	1	2	3	□
M16	I enjoyed life	0	1	2	3	□
M17	I had crying spells	0	1	2	3	□
M18	I felt sad	0	1	2	3	□
M19	I felt that people disliked me	0	1	2	3	□
M20	I could not "get going"	0	1	2	3	□

□.□□□

VISUAL FUNCTIONING QUESTIONNAIRE					
PART 1: GENERAL HEALTH AND VISION					
READ: I would like to ask you about your vision-related quality of life					
V1	In general, would you say your overall health is: (READ CATEGORIES)	Excellence	1		□
		Very good	2		
		Good	3		
		Fair	4		
		Poor	5		
V1a	Are you wearing contact lens or glasses?	Yes	1		□
		No	2		
V2	At the present time, would you say your eyesight using both eyes (with glasses or contact lenses, if you wear them) is excellent, good, fair, poor, or very poor or are you completely blind? (READ CATEGORIES)	Excellence	1		□
		Good	2		
		Fair	3		
		Poor	4		
		Very poor	5		
		Completely blind	6		
V3	How much of the time do you worry about your eyesight? (READ CATEGORIES)	None of the time	1		□
		A little of the time	2		
		Some of the time	3		
		Most of the time	4		
		All of the time	5		
V4	How much pain or discomfort have you had in and around your eyes (for example, burning, itching, or aching)? Would you say it is: (READ CATEGORIES)	None	1		□
		Mild	2		
		Moderate	3		
		Severe	4		
		Very severe	5		
PART 2: DIFFICULTY WITH ACTIVITIES					
READ: The next questions are about how much difficulty, if any, you have doing certain activities wearing your glasses or contact lenses if you use them for that activity.					
V5	How much difficulty do you have reading ordinary print in newspapers? Would you say you have: (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V6	How much difficulty do you have doing work or hobbies that require you to see well up close, such as cooking, sewing, fixing things around the house, or using hand tools? Would you say: (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V7	Because of your eyesight, how much difficulty do you have finding something on a crowded shelf? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		

□.□□□

V8	How much difficulty do you have reading street signs or the names of stores? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V9	Because of your eyesight, how much difficulty do you have going down steps, stairs, or curbs in dim light or at night? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V10	Because of your eyesight, how much difficulty do you have noticing objects off to the side while you are walking along? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V11	Because of your eyesight, how much difficulty do you have seeing how people react to things you say? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V12	Because of your eyesight, how much difficulty do you have picking out and matching your own clothes? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V13	Because of your eyesight, how much difficulty do you have visiting with people in their homes, at parties, or in restaurants? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V14	Because of your eyesight, how much difficulty do you have going out to see movies, plays, or sports events? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		

□.□□□

PART 3: CATARACT AND DRIVING/RIDING DIFFICULTY					
READ: Now, I would like to ask you about driving a car/riding a motor bike.					
V15	Are you currently driving a car/riding a motorbike at least once in a while?	Yes	1	→ *V15c*	□
		No	2		
V15a	IF NO, ASK: Have you never driven a car/motorbike/bicycle or have you given up driving?	Never drove	1	→ *V17*	□
		Gave up driving	2		
V15b	IF GAVE UP DRIVING/RIDING, the main reason was	Eyesight	1	→ *V17*	□
		Other reasons	2		
		Both eyesight and other reasons	3		
V15c	IF CURRENTLY DRIVING OR RIDING: How much difficulty do you have driving/riding during the daytime in familiar places? Would you say you have:	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
V16	How much difficulty do you have driving at night? Would you say you have: (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Have you stopped doing this because of your eyesight	5		
		Have you stopped doing this for other reasons or are you not interested in doing this	6		
V16a	How much difficulty do you have driving in difficult conditions, such as in bad weather, during rush hour, on the freeway, or in traffic? Would you say you have:	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Have you stopped doing this because of your eyesight	5		
		Have you stopped doing this for other reasons or are you not interested in doing this	6		
PART 4: ADDITIONAL INFORMATION					
V16b	Which type of vehicle(s) do you drive/ride? *(You can choose more than one option)*	Bicycle	1		□
			2		
		Scooter/motorbike	1		□
			2		
		Car	1		□
			2		
		Other	1		□
			2		
V16c	In an average week, how many times would you drive/ride?	Times per week □□□			
V16d	In an average week, how many kilometers would you travel?	Km per week □□□			
V16e	How many crashes have you been involved in over the past 12 months when you were the driver/rider? *(Please include crashes with other motor vehicles, fixed objects, animals and roll-over crashes in your response. Please tell me the number of crashes whether or not you were at fault)*	□□□			

☐.☐☐☐

PART 5: RESPONSES TO VISION PROBLEMS							
READ: The next questions are about how things you do may be affected by your vision. For each one, I'd like you to tell me if this is true for you all, most, some, a little, or none of the time.							
		All of the time	Most of the time	Some of the time	A little of the time	None of the time	
V17	Do you accomplish less than you would like because of your vision?	1	2	3	4	5	☐
V18	Are you limited in how long you can work or do other activities because of your vision?	1	2	3	4	5	☐
V19	How much does pain or discomfort in or around your eyes, for example, burning, itching, or aching, keep you from doing what you'd like to be doing? Would you say:	1	2	3	4	5	☐
READ: For each of the following statements, please tell me if it is definitely true, mostly true, mostly false, or definitely false for you or you are not sure.							
		Definitely true	Mostly true	Not sure	Mostly false	Definitely False	
V20	I stay home most of the time because of my eyesight	1	2	3	4	5	☐
V21	I feel frustrated a lot of the time because of my eyesight	1	2	3	4	5	☐
V22	I have much less control over what I do, because of my eyesight	1	2	3	4	5	☐
V23	Because of my eyesight, I have to rely too much on what other people tell me	1	2	3	4	5	☐
V24	I need a lot of help from others because of my eyesight	1	2	3	4	5	☐
V25	I worry about doing things that will embarrass myself or others, because of my eyesight	1	2	3	4	5	☐

□.□□□

STEREOPSIS

READ: Please sit down and hold the picture straight at the distance of 40.6 cm from your eyes. Please wear your glasses if you do so for reading.

STEREO FLY TEST

ĐỌC: Please try to pinch the tip of the wing between your thumb and forefinger	Seconds	Correct
The patient **CANNOT** see 3D fly	> 3.552	☐
The patient can see 3D fly	3.552	☐

STEREOPTEST – CIRCLES

READ: Start with the number 1, please look at each of the four circles and tell me which one seems to come out closer to you – top, bottom, right or left.	1	Bottom	800	☐
	2	Left	400	☐
	3	Bottom	200	☐
	4	Top	140	☐
	5	Top	100	☐
	6	Left	80	☐
	7	Right	60	☐
	8	Left	50	☐
	9	Right	40	☐

STEREOPTEST – ANIMALS

READ: Does one of these animals seem to come out closer to you than the others?	A	Cat	400	☐
	B	Rabbit	200	☐
	C	Monkey	100	☐
Angle (seconds)				□□□□

□.□□□

VISUAL ACUITY

LEFT EYE

READ: Please cover your right eye and read the letters on the chart with your left eye.

1	R	
2	D K	
3	C H V	
4	O Z N S	
5	C H R N S	
6	Z R K V D H	
7	V H D S N K O Z C	_____
8	S N K H O Z C V R D	
9	R Z O H K V D K S N	
10	V S H R K D N O Z C	
12	Z O N O K R V D S	
15	C K R Z O D S N V	

RIGHT EYE

READ: Please cover your left eye and read the letters on the chart with your right eye.

1	R	
2	D K	
3	C H V	
4	O Z N S	
5	C H R N S	
6	Z R K V D H	
7	V H D S N K O Z C	_____
8	S N K H O Z C V R D	
9	R Z O H K V D K S N	
10	V S H R K D N O Z C	
12	Z O N O K R V D S	
15	C K R Z O D S N V	

BOTH EYES

READ: Please read the letters on the chart with your both eyes.

1	R	
2	D K	
3	C H V	
4	O Z N S	
5	C H R N S	
6	Z R K V D H	
7	V H D S N K O Z C	_____
8	S N K H O Z C V R D	
9	R Z O H K V D K S N	
10	V S H R K D N O Z C	
12	Z O N O K R V D S	
15	C K R Z O D S N V	

Pelli-Robson Contrast Sensitivity Test

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

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Pelli-Robson Contrast Sensitivity Test

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

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□.□□□

THÔNG TIN CHUNG					
Trước tiên, cháu xin hỏi Bác một số thông tin chung về bản thân Bác					
A1	Tình trạng hôn nhân của Bác?	Độc thân	1		□
		Kết hôn/sống như vợ chồng	2		
		Góa	3		
		Ly dị/ly thân	4		
A2	Hiện tại Bác đang sống với những ai? (CÂU HỎI NHIỀU LỰA CHỌN)	Một mình	1	→ A4	□
			2		
		Chồng/vợ	1		□
			2		
		Con/dâu/rể	1		□
			2		
		Khác (ghi rõ)	1		□
			2		
A3	Hiện tại có bao nhiêu người sống chung nhà với bác?	Người □□			
A4	Bằng cấp cao nhất của Bác?	Không đi học	1		□
		Biết đọc/biết viết	2		
		Cấp 1	3		
		Cấp 2	4		
		Cấp 3	5		
		Trường nghề	6		
		Đại học	7		
A5	Hiện nay bác đang làm nghề gì?	Hưu/Già/Mất sức lao động	1		□
		Nội trợ	2		
		Kinh doanh/buôn bán	3		
		Nhân viên văn phòng	4		
		Công nhân	5		
		Chạy xe ôm	6		
		Tài xế (taxi, xe tải, ...)	7		
		Nghề tự do (thợ hồ, làm thuê, làm nông, ...)	8		
		Khác (ghi rõ)	9		
A6	Trung bình một tháng, gia đình của bác thu nhập bao nhiêu? (TRIỆU)	□□□.□			
A7	Bác là người dân tộc gì?	Kinh	1		□
		Hoa	2		
		Khơme	3		
		Khác (ghi rõ)	4		
A8	Bác theo đạo gì?	Không theo đạo	1		□
		Phật	2		
		Thiên Chúa	3		
		Khác (ghi rõ)	4		

□.□□□

TÌNH TRẠNG BỆNH TẬT					
B1	Hiện tại Bác có đang sử dụng bất kỳ toa thuốc nào do Bác sĩ kê toa không?	Có	1		□
		Không	2	→ B3	
B2	Xin bác hãy kể tên các loại thuốc đang dùng				
B3	Hiện tại Bác có đang sử dụng bất kỳ toa thuốc nào mà không do Bác sĩ kê toa không?	Có	1		□
		Không	2	→ B5	
B4	Xin bác hãy kể tên các loại thuốc đang dùng				
ĐỌC: Hiện tại bác có nghe bác sĩ nói bác bị những bệnh sau đây hay không?					
B5	Ung thư	Có	1		□
		Không	2		
B6	Tim mạch	Có	1		□
		Không	2		
B7	Chứng đau thắt ngực	Có	1		□
		Không	2		
B8	Đột quỵ (tai biến)	Có	1		□
		Không	2		
B9	Cao huyết áp	Có	1		□
		Không	2		
B10	Viêm khớp dạng thấp	Có	1		□
		Không	2		
B11	Viêm khớp mãn tính	Có	1		□
		Không	2		
B12	Bệnh thận	Có	1		□
		Không	2		
B13	Động kinh	Có	1		□
		Không	2		
B14	Tổn thương thính lực	Có	1		□
		Không	2		
B15	Hội chứng ngưng thở lúc ngủ	Có	1		□
		Không	2		
B16	Suyễn	Có	1		□
		Không	2		
B17	Máu nhiễm mỡ, rối loạn lipid máu	Có	1		□
		Không	2		
B18	Lạm dụng hay nghiện rượu	Có	1		□
		Không	2		
B19	Khác (ghi rõ)				

□.□□□

TÉ NGÃ VÀ CHẤN THƯƠNG

ĐỌC: Cháu sẽ hỏi Bác vài câu hỏi về tình trạng té ngã và chấn thương của Bác trong suốt 12 tháng qua.

F1	Trong **12 tháng qua**, Bác có bị té hay ngã trên sàn hoặc nền đất hay không? *Té ngã được xem "như là tình trạng bệnh nhân nằm xuống sàng, mặt đất hoặc những nơi có độ cao thấp hơn một cách không chủ ý".*	Có	1		□
		Không	2	→ *F3*	
F2	**Nếu có**, Bác bị té ngã bao nhiêu lần?				□□

Đối với mỗi lần ngã, Bác có cần nhập viện hay chăm sóc y tế không

	Lần	Cần nhập viện		Cần chăm sóc y tế		Nguyên nhân té ngã	Vị trí chấn thương	Bác làm gì khi bị té ngã
		Có	Không	Có	Không			
F2a	1	□	□	□	□			
F2b	2	□	□	□	□			
F2c	3	□	□	□	□			
F2d	4	□	□	□	□			
F2e	5	□	□	□	□			

F3	**Trong 12 tháng qua**, Bác có bị chấn thương nào mà không do té ngã gây ra hay không (ví dụ như bỏng, gãy xương, bầm, xước, bông gân,...)?	Có	1		□
		Không	2	→ *M1*	
F4	**Nếu có**, Bác đã bị chấn thương bao nhiêu lần?				□□

Đối với mỗi chấn thương, Bác có cần nhập viện hay chăm sóc y tế không

	Lần	Cần nhập viện		Cần chăm sóc y tế		Nguyên nhân chấn thương	Vị trí chấn thương	Bác làm gì khi bị chấn thương
		Có	Không	Có	Không			
F4a	1	□	□	□	□			
F4b	2	□	□	□	□			
F4c	3	□	□	□	□			
F4d	4	□	□	□	□			
F4e	5	□	□	□	□			

□.□□□

TRẦM CẢM						
ĐỌC: Kế tiếp là danh mục những điều mà Bác cảm thấy hay cư xử. Xin Bác hãy cho biết bác đã cảm thấy hay đã làm những điều này bao nhiêu ngày trong tuần vừa qua.						
Trong tuần vừa qua, có bao nhiêu ngày		**< 1 ngày**	**1-2 ngày**	**3-4 ngày**	**5-7 ngày**	
M1	Bác bực mình vì những việc mà trước đây không làm bác bực	0	1	2	3	□
M2	Bác ăn không ngon miệng hay không cảm thấy thích ăn	0	1	2	3	□
M3	Bác cảm thấy bác không thể quên đi những nỗi buồn dù đã được gia đình hoặc bạn bè an ủi	0	1	2	3	□
M4	Bác cảm thấy bác cũng bình thường như những người khác	0	1	2	3	□
M5	Bác gặp khó khăn khi ghi nhớ những việc bác đang làm	0	1	2	3	□
M6	Bác cảm thấy bị trầm cảm	0	1	2	3	□
M7	Bác cảm thấy bác phải nỗ lực để làm những việc bác muốn làm	0	1	2	3	□
M8	Bác cảm thấy hy vọng về tương lai	0	1	2	3	□
M9	Bác cảm thấy đời mình là một thất bại	0	1	2	3	□
M10	Bác cảm thấy sợ hãi	0	1	2	3	□
M11	Bác ngủ không ngon giấc	0	1	2	3	□
M12	Bác cảm thấy vui vẻ	0	1	2	3	□
M13	Bác nói chuyện ít hơn bình thường	0	1	2	3	□
M14	Bác cảm thấy cô đơn	0	1	2	3	□
M15	Bác cảm thấy mọi người không thân thiện với bác	0	1	2	3	□
M16	Bác yêu thích cuộc sống	0	1	2	3	□
M17	Bác luôn muốn khóc	0	1	2	3	□
M18	Bác cảm thấy buồn	0	1	2	3	□
M19	Bác cảm thấy mọi người không thích bác	0	1	2	3	□
M20	Bác không thể "ra khỏi giường khi thức giấc"	0	1	2	3	□

□.□□□

CÁC CÂU HỎI VỀ CHỨC NĂNG THỊ LỰC					
PHẦN 1: SỨC KHỎE TỔNG QUÁT VÀ THỊ LỰC					
ĐỌC: Cháu sẽ hỏi bác về chất lượng sống liên quan tới thị lực của bác					
V1	Nhìn chung, bác nghĩ rằng sức khỏe mình đạt loại nào? (ĐỌC CÂU TRẢ LỜI)	Tuyệt vời	1		□
		Rất tốt	2		
		Tốt	3		
		Bình thường	4		
		Kém	5		
V1a	Bác có đeo kính hay kính áp tròng không?	Có	1		□
		Không	2		
V2	Hiện tại, thị lực của **<u>cả 2 mắt</u>** của bác (nếu bác có đeo kính hoặc kính áp tròng, xin hãy trả lời như khi bác đeo chúng) là tuyệt vời, rất tốt, tốt, trung bình, kém, hay hoàn toàn không thấy gì? (ĐỌC CÂU TRẢ LỜI)	Tuyệt vời	1		□
		Tốt	2		
		Trung bình	3		
		Kém	4		
		Rất kém	5		
		Hoàn toàn không thấy gì	6		
V3	Bác có thường xuyên lo lắng về thị lực của mình không? (ĐỌC CÂU TRẢ LỜI)	Không bao giờ	1		□
		Rất hiếm khi	2		
		Đôi khi	3		
		Thường lo lắng	4		
		Luôn luôn lo lắng	5		
V4	Mắt bác bị đau hay khó chịu (ví dụ như nóng, ngứa, rát hay đau) đến mức nào? Bác sẽ nói: (ĐỌC CÂU TRẢ LỜI)	Không	1		□
		Nhẹ	2		
		Vừa phải	3		
		Nặng	4		
		Rất nặng	5		
PHẦN 2: KHÓ KHĂN KHI HOẠT ĐỘNG					
ĐỌC: Những câu hỏi tiếp theo là hỏi về những khó khăn mà bác có thể gặp phải, nếu Bác có đeo kính hay kính áp tròng thì hãy trả lời như khi bác đeo kính hay kính áp tròng cho những hoạt động dưới đây.					
V5	Bác có gặp khó khăn gì khi đọc báo với cỡ chữ bình thường hay không? Bác sẽ nói: (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V6	Bác có gặp khó khăn gì khi làm việc hay vui chơi mà cần phải thấy rõ ở cự ly gần như nấu nướng, may vá, sửa chữa các vật dụng trong nhà, hay dùng các dụng cụ cầm tay? Bác sẽ nói: (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V7	Do thị lực của Bác, Bác có cảm thấy khó khăn gì khi tìm các đồ vật ở trên kệ có nhiều vật dụng không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		

□.□□□

V8	Bác có gặp khó khăn gì khi xem các biển báo giao thông hay tên của các cửa hàng hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V9	Do thị lực của Bác, Bác có cảm thấy khó khăn gì khi đi xuống cầu thang, thềm nhà, hay bậc cửa lúc trời tối hoặc thiếu ánh sáng hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V10	Do thị lực của Bác, Bác có cảm thấy khó khăn gì khi chú ý tới những vật nằm xa về phía Bác đang đi hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V11	Do thị lực của Bác, Bác có gặp khó khăn gì khi nhìn những người khác phản ứng lại những gì Bác nói hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V12	Do thị lực của Bác, Bác có gặp khó khăn gì khi chọn và lấy quần áo hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V13	Do thị lực của Bác, Bác có gặp khó khăn gì khi đến thăm người khác tại nhà của họ hoặc khi đi dự tiệc hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V14	Do thị lực của Bác, Bác có gặp khó khăn gì khi đi xem phim, kịch, hay các trận thi đấu thể thao hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		

□.□□□

PHẦN 3: ĐỤC THỦY TINH THỂ VÀ KHÓ KHĂN KHI CHẠY XE					
ĐỌC: Bây giờ, cháu sẽ hỏi Bác một số câu hỏi về việc chạy xe của Bác					
V15	Hiện tại, thỉnh thoảng bác có chạy xe không?	Có	1	→ *V15c*	□
		Không	2		
V15a	Nếu KHÔNG, HỎI: Bác chưa bao giờ chạy xe hay bác không còn chạy xe nữa?	Chưa bao giờ chạy	1	→ *V17*	□
		Không còn chạy nữa	2		
V15b	NẾU BÁC KHÔNG CÒN CHẠY XE NỮA, lý do chính là do thị lực của bác hay do nguyên nhân nào khác?	Thị lực	1	→ *V17*	□
		Lý do khác (ghi rõ)	2		
		Cả thị lực và lý do khác	3		
V15c	NẾU BÁC ĐANG CHẠY XE: Bác có gặp khó khăn gì khi chạy xe vào ban ngày tại những địa điểm quen thuộc hay không?	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
V16	Bác có gặp khó khăn gì khi chạy xe ban đêm hay không?	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V16a	Bác có gặp khó khăn gì khi chạy xe trong những điều kiện khó khăn như thời tiết xấu, giờ cao điểm, đường đông xe, hay đường cao tốc không?	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
PHẦN 4: CÁC THÔNG TIN BỔ SUNG					
V16b	Bác chạy xe gì? (CÂU HỎI NHIỀU LỰA CHỌN)	Xe đạp	1		□
			2		
		Xe máy	1		□
			2		
		Xe hơi	1		□
			2		
		Khác (ghi rõ)	1		□
			2		
V16c	Trong một tuần, trung bình bác chạy xe mấy lần?	Lần/tuần □□□			
V16d	Trong một tuần, trung bình bác chạy xe bao nhiêu km?	Km/tuần □□□□			
V16e	Trong 12 tháng qua, khi đang chạy xe Bác bị va chạm bao nhiêu lần? *(Xin hãy kể những vụ va chạm với xe, chướng ngại vật, động vật và cả khi bị lật xe. Xin hãy cho biết tổng số vụ tai nạn dù do lỗi của Bác hay người khác)*	Số vụ □□			

□.□□□

PHẦN 5: ĐÁP ỨNG VỚI NHỮNG VẤN ĐỀ THỊ LỰC

ĐỌC: Những câu hỏi tiếp theo là hỏi về những việc mà có thể ảnh hưởng đến thị lực của Bác. Đối với từng việc, Bác có thể cho cháu biết thực tế *"lúc nào cũng xảy ra", "thường xuyên xảy ra", "đôi khi xảy ra", "ít khi xảy ra", hay "chưa bao giờ xảy ra".*

		Lúc nào cũng xảy ra	Thường xảy ra	Đôi khi xảy ra	Ít khi xảy ra	Chưa bao giờ xảy ra	
V17	Do thị lực của Bác, nên Bác ít đạt được những gì Bác muốn?	1	2	3	4	5	□
V18	Do thị lực của Bác nên Bác làm việc và sinh hoạt ít hơn bình thường?	1	2	3	4	5	□
V19	Mắt của Bác có thường xuyên bị đau hay khó chịu không, ví dụ như bỏng/rát, thốn, đau làm cho bác không thể làm được những việc bác muốn làm?	1	2	3	4	5	□

ĐỌC: Đối với những câu sau đây, Bác hãy cho tôi biết nếu *"đúng hoàn toàn", "đúng một phần", "không chắc", "hơi sai", hay "hoàn toàn sai"* với tình trạng của Bác hiện nay.

		Đúng hoàn toàn	Gần đúng	Không chắc	Hơi sai	Hoàn toàn sai	
V20	Bác ở nhà hầu hết thời gian do thị lực của bác	1	2	3	4	5	□
V21	Bác cảm thấy rất nản do thị lực của bác	1	2	3	4	5	□
V22	Bác ít khi kiểm soát được việc bác làm do thị lực của bác	1	2	3	4	5	□
V23	Do thị lực của bác, bác phải lệ thuộc quá nhiều vào những gì mà người khác bảo bác làm	1	2	3	4	5	□
V24	Bác cần rất nhiều sự giúp đỡ từ người khác do thị lực của bác	1	2	3	4	5	□
V25	Bác sợ bác làm những việc ảnh hưởng xấu tới bản thân và người khác do thị lực của bác	1	2	3	4	5	□

□.□□□

STEREOPSIS

ĐỌC: Bác hãy ngồi thẳng và giữ hình trước mặt bác cách mắt khoảng 40,6 cm. Nếu bác có **đeo kính** khi đọc sách xin bác hãy đeo kính vào.

STEREO FLY TEST		
ĐỌC: Bác hãy lấy ngón cái và ngón trỏ kẹp cánh con ruồi.	Seconds	Đúng
Bệnh nhân **KHÔNG** thấy hình ảnh 3 chiều của cánh ruồi	> 3.552	☐
Bệnh nhân thấy hình ảnh 3 chiều của cánh ruồi	3.552	☐

STEREOPTEST – CIRCLES				
ĐỌC: Bắt đầu với hình số 1, bác hãy nhìn vào bốn hình tròn phía trên, dưới, trái, phải và cho biết hình tròn nào đang nhô lên về phía bác?	1	Dưới	800	☐
	2	Trái	400	☐
	3	Dưới	200	☐
	4	Trên	140	☐
	5	Trên	100	☐
	6	Trái	80	☐
	7	Phải	60	☐
	8	Trái	50	☐
	9	Phải	40	☐

STEREOPTEST – ANIMALS				
ĐỌC: Bác hãy nhìn vào hình A và cho biết con vật nào đang nhô lên về phía bác.	A	Mèo	400	☐
	B	Thỏ	200	☐
	C	Khỉ	100	☐
Góc nhìn (seconds)				□□□□

□.□□□

ĐO THỊ LỰC

MẮT TRÁI

ĐỌC: Bây giờ bác hãy che mắt phải lại và dùng mắt trái để đọc các chữ cái trên bảng.	1	R	————
	2	D K	
	3	C H V	
	4	O Z N S	
	5	C H R N S	
	6	Z R K V D H	
	7	V H D S N K O Z C	
	8	S N K H O Z C V R D	
	9	R Z O H K V D K S N	
	10	V S H R K D N O Z C	
	12	Z O N O K R V D S	
	15	C K R Z O D S N V	

MẮT PHẢI

ĐỌC: Bây giờ bác hãy che mắt trái lại và dùng mắt phải để đọc các chữ cái trên bảng	1	R	————
	2	D K	
	3	C H V	
	4	O Z N S	
	5	C H R N S	
	6	Z R K V D H	
	7	V H D S N K O Z C	
	8	S N K H O Z C V R D	
	9	R Z O H K V D K S N	
	10	V S H R K D N O Z C	
	12	Z O N O K R V D S	
	15	C K R Z O D S N V	

HAI MẮT

ĐỌC: Bây giờ bác hãy dùng hai mắt để đọc các chữ cái trên bảng.	1	R	————
	2	D K	
	3	C H V	
	4	O Z N S	
	5	C H R N S	
	6	Z R K V D H	
	7	V H D S N K O Z C	
	8	S N K H O Z C V R D	
	9	R Z O H K V D K S N	
	10	V S H R K D N O Z C	
	12	Z O N O K R V D S	
	15	C K R Z O D S N V	

Pelli-Robson Contrast Sensitivity Test

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

Haag-Streit UK Ltd., Edinburgh Way, Harlow Essex CM20 2TT UK 01279 414969 or Haag-Streit Service, Inc. 5500 Courseview Drive, Mason, Ohio 45040, U.S.A. Tel: 513-336-7255 Fax: 513-336-7260
REF: 7002252 Issue 2 11/08 CE

Pelli-Robson Contrast Sensitivity Test

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

Haag-Streit UK Ltd., Edinburgh Way, Harlow Essex CM20 2TT UK 01279 414969 or Haag-Streit Service, Inc. 5500 Courseview Drive, Mason, Ohio 45040, U.S.A. Tel: 513-336-7255 Fax: 513-336-7260

REF: 7002252 Issue 2 11/08 CE

Appendix 5: Questionnaire for the second interview

2.□□□

BASELINE INFORMATION					
K1	Date of second interview	□□.□□.□□□□			
K2	How many your eyes were operated?	One eye	1		□
		Two eyes	2	→ A1	
		No eye	3	→ K5	
K3	Which your eye was operated?	Left eye	1		□
		Right eye	2		
K4	Why did you not have second surgery done?	*After answer → A1*			
K5	Why did you not have any surgery done?	*After answer → stop interviewing*			

2.☐☐☐

GENERAL INFORMATION					
First, we would like to ask you some general information					
A1	Are you?	Single	1		☐
		Married/De facto	2		
		Widow	3		
		Divorced/Seperated	4		
A2	Who do you live alone? (MULTI-CHOICE QUESTION)	Alone	1	→ A4	☐
			2		
		Husband/Wife	1		☐
			2		
		Children	1		☐
			2		
		Other	1		☐
			2		
A3	How many people do you live with in your home?	People ☐☐			
A4	What is the highest level of education you have completed?	Did not attend school	1		☐
		Can read and write	2		
		Primary school	3		
		Junior high school	4		
		Senior high school	5		
		Vocational school	6		
		University degree	7		
A5	What is your occupation	Retire/old/cannot work	1		☐
		Housewife	2		
		Bussinness/self-employed	3		
		Office worker	4		
		Worker	5		
		Motorbike taxi rider	6		
		Taxi driver	7		
		Free-occupation (bricklayer, hired man, farmer,...)	8		
		Other (please specify)	9		
A6	On average, how much money did your household earn per month? (million)	☐☐☐.☐			
A7	What is your ethnic back ground?	Kinh	1		☐
		Hoa	2		
		Khome	3		
		Other (please specify)	4		
A8	What is your religion?	No religion	1		☐
		Buddhist	2		
		Catholic	3		
		Other (please specify)	4		

2.☐☐☐

MORBIDITY					
B1	Are you taking any prescription drugs (drugs that a doctor has told you to take) at the present time?	Yes	1		☐
		No	2	→ B3	
B2	If yes, please specify the drugs				
B3	Are you taking any drugs that are available over the counter (without a doctor's prescription) from a pharmacy (chemist) at the present time?	Yes	1		☐
		No	2	→ B5	
B4	If yes, please specify the drugs				
Do you currently have a confirmed diagnosis from your general doctor for following medical conditions?					
B5	Cancer	Yes	1		☐
		No	2		
B6	Heart diseases	Yes	1		☐
		No	2		
B7	Angina	Yes	1		☐
		No	2		
B8	Stroke	Yes	1		☐
		No	2		
B9	Hypertension	Yes	1		☐
		No	2		
B10	Rheumatoid arthritis	Yes	1		☐
		No	2		
B11	Osteoarthritis	Yes	1		☐
		No	2		
B12	Kidney disease	Yes	1		☐
		No	2		
B13	Epilepsy	Yes	1		☐
		No	2		
B14	Hearing impairment	Yes	1		☐
		No	2		
B15	Sleep apnoea	Yes	1		☐
		No	2		
B16	Asthma	Yes	1		☐
		No	2		
B17	Alohol abuse or dependence	Yes	1		☐
		No	2		
B18	High blood cholesterol	Yes	1		☐
		No	2		
B19	Other (please specify)				

2.☐☐☐

FALLS AND OTHER INJURIES

READ: We are going to ask you some questions about your fall and injury status, please think about your situation after your cataract surgery

F1	**After your cataract surgery**, have you fallen and landed on the floor or ground? *A fall will be defined "as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level"*	Yes	1		☐
		No	2	→ *F3*	
F2	**If yes,** how many times have you fallen?				☐☐

For each fall, did you require hospitalisation or other medical attention

	Fall number	Require hospitalisation		Required medical attention		Cause of fall	Injurious position	What were you doing at the time of fall
		Yes	No	Yes	No			
F2a	1	☐	☐	☐	☐			
F2b	2	☐	☐	☐	☐			
F2c	3	☐	☐	☐	☐			
F2d	4	☐	☐	☐	☐			
F2e	5	☐	☐	☐	☐			

F3	**After your cataract surgery**, did you have any other injuries that were not related to fall (for example burn, fracture, contusion, sprain, lacerations, etc...)?	Yes	1		☐
		No	2	→ *M1*	
F4	**If yes,** how many other injuries did you have?				☐☐

For each injury, did you require hospitalisation or other medical attention

	Injury number	Require hospitalisation		Required medical attention		Cause of injury	Injurious position	What were you doing at the time of injury
		Yes	No	Yes	No			
F4a	1	☐	☐	☐	☐			
F4b	2	☐	☐	☐	☐			
F4c	3	☐	☐	☐	☐			
F4d	4	☐	☐	☐	☐			
F4e	5	☐	☐	☐	☐			

2.☐☐☐

DEPRESSION						
READ: Next is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the past week						
During the past week		< 1 day	1-2 days	3-4 days	5-7 days	
M1	I was bothered by things that usually don't bother me	0	1	2	3	☐
M2	I did not feel like eating; my appetite was poor	0	1	2	3	☐
M3	I felt that I could not shake off the blues even with help from my family	0	1	2	3	☐
M4	I felt that I was just as good as other people	0	1	2	3	☐
M5	I had trouble keeping my mind on what I was doing	0	1	2	3	☐
M6	I felt depressed	0	1	2	3	☐
M7	I felt that everything I did was an effort	0	1	2	3	☐
M8	I felt hopeful about the future	0	1	2	3	☐
M9	I thought my life had been a failure	0	1	2	3	☐
M10	I felt fearful	0	1	2	3	☐
M11	My sleep was restless	0	1	2	3	☐
M12	I was happy	0	1	2	3	☐
M13	I talked less than usual	0	1	2	3	☐
M14	I felt lonely	0	1	2	3	☐
M15	People were unfriendly	0	1	2	3	☐
M16	I enjoyed life	0	1	2	3	☐
M17	I had crying spells	0	1	2	3	☐
M18	I felt sad	0	1	2	3	☐
M19	I felt that people disliked me	0	1	2	3	☐
M20	I could not "get going"	0	1	2	3	☐

VISUAL FUNCTIONING QUESTIONNAIRE					
PART 1: GENERAL HEALTH AND VISION					
READ: I would like to ask you about your vision-related quality of life					
V1	In general, would you say your overall health is: (READ CATEGORIES)	Excellence	1		□
		Very good	2		
		Good	3		
		Fair	4		
		Poor	5		
V1a	Are you wearing contact lens or glasses?	Yes	1		□
		No	2		
V2	At the present time, would you say your eyesight using both eyes (with glasses or contact lenses, if you wear them) is excellent, good, fair, poor, or very poor or are you completely blind? (READ CATEGORIES)	Excellence	1		□
		Good	2		
		Fair	3		
		Poor	4		
		Very poor	5		
		Completely blind	6		
V3	How much of the time do you worry about your eyesight? (READ CATEGORIES)	None of the time	1		□
		A little of the time	2		
		Some of the time	3		
		Most of the time	4		
		All of the time	5		
V4	How much pain or discomfort have you had in and around your eyes (for example, burning, itching, or aching)? Would you say it is: (READ CATEGORIES)	None	1		□
		Mild	2		
		Moderate	3		
		Severe	4		
		Very severe	5		
PART 2: DIFFICULTY WITH ACTIVITIES					
READ: The next questions are about how much difficulty, if any, you have doing certain activities wearing your glasses or contact lenses if you use them for that activity.					
V5	How much difficulty do you have reading ordinary print in newspapers? Would you say you have: (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V6	How much difficulty do you have doing work or hobbies that require you to see well up close, such as cooking, sewing, fixing things around the house, or using hand tools? Would you say: (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V7	Because of your eyesight, how much difficulty do you have finding something on a crowded shelf? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		

V8	How much difficulty do you have reading street signs or the names of stores? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V9	Because of your eyesight, how much difficulty do you have going down steps, stairs, or curbs in dim light or at night? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V10	Because of your eyesight, how much difficulty do you have noticing objects off to the side while you are walking along? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V11	Because of your eyesight, how much difficulty do you have seeing how people react to things you say? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V12	Because of your eyesight, how much difficulty do you have picking out and matching your own clothes? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V13	Because of your eyesight, how much difficulty do you have visiting with people in their homes, at parties, or in restaurants? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		
V14	Because of your eyesight, how much difficulty do you have going out to see movies, plays, or sports events? (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Stopped doing this because of your eyesight	5		
		Stopped doing this for other reasons or not interested in doing this	6		

PART 3: CATARACT AND DRIVING/RIDING DIFFICULTY					
READ: Now, I would like to ask you about driving a car/riding a motor bike.					
V15	Are you currently driving a car/riding a motorbike at least once in a while?	Yes	1	→ *V15c*	□
		No	2		
V15a	IF NO, ASK: Have you never driven a car/motorbike/bicycle or have you given up driving?	Never drove	1	→ *V26*	□
		Gave up driving	2		
V15b	IF GAVE UP DRIVING/RIDING, the main reason was	Eyesight	1	→ *V26*	□
		Other reasons	2		
		Both eyesight and other reasons	3		
V15c	IF CURRENTLY DRIVING OR RIDING: How much difficulty do you have driving/riding during the daytime in familiar places? Would you say you have:	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
V16	How much difficulty do you have driving at night? Would you say you have: (READ CATEGORIES AS NEEDED)	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Have you stopped doing this because of your eyesight	5		
		Have you stopped doing this for other reasons or are you not interested in doing this	6		
V16a	How much difficulty do you have driving in difficult conditions, such as in bad weather, during rush hour, on the freeway, or in traffic? Would you say you have:	No difficulty at all	1		□
		A little difficulty	2		
		Moderate difficulty	3		
		Extreme difficulty	4		
		Have you stopped doing this because of your eyesight	5		
		Have you stopped doing this for other reasons or are you not interested in doing this	6		
PART 4: ADDITIONAL INFORMATION					
V16b	Which type of vehicle(s) do you drive/ride? *(You can choose more than one option)*	Bicycle	1		□
			2		
		Scooter	1		□
			2		
		Car	1		□
			2		
		Other	1		□
			2		
V16c	In an average week, how many times would you drive/ride?	Times per week □□□			
V16d	In an average week, how many kilometers would you travel?	Km per week □□□			
V16e	How many crashes have you been involved in over the past 12 months when you were the driver/rider? *(Please include crashes with other motor vehicles, fixed objects, animals and roll-over crashes in your response. Please tell me the number of crashes whether or not you were at fault)*	Crashes □□			

PART 5: RESPONSES TO VISION PROBLEMS

READ: The next questions are about how things you do may be affected by your vision. For each one, I'd like you to tell me if this is true for you all, most, some, a little, or none of the time.

		All of the time	Most of the time	Some of the time	A little of the time	None of the time	
V17	Do you accomplish less than you would like because of your vision?	1	2	3	4	5	☐
V18	Are you limited in how long you can work or do other activities because of your vision?	1	2	3	4	5	☐
V19	How much does pain or discomfort in or around your eyes, for example, burning, itching, or aching, keep you from doing what you'd like to be doing? Would you say:	1	2	3	4	5	☐

READ: For each of the following statements, please tell me if it is definitely true, mostly true, mostly false, or definitely false for you or you are not sure.

		Definitely true	Mostly true	Not sure	Mostly false	Definitely False	
V20	I stay home most of the time because of my eyesight	1	2	3	4	5	☐
V21	I feel frustrated a lot of the time because of my eyesight	1	2	3	4	5	☐
V22	I have much less control over what I do, because of my eyesight	1	2	3	4	5	☐
V23	Because of my eyesight, I have to rely too much on what other people tell me	1	2	3	4	5	☐
V24	I need a lot of help from others because of my eyesight	1	2	3	4	5	☐
V25	I worry about doing things that will embarrass myself or others, because of my eyesight	1	2	3	4	5	☐

2.☐☐☐

STEREOPSIS

READ: Please sit down and hold the picture straight at the distance of 40.6 cm from your eyes. Please wear your glasses if you do so for reading.

STEREO FLY TEST

ĐỌC: Please try to pinch the tip of the wing between your thumb and forefinger	Seconds	Correct
The patient **CANNOT** see 3D fly	> 3.552	☐
The patient can see 3D fly	3.552	☐

STEREOPTEST – CIRCLES

READ: Start with the number 1, please look at each of the four circles and tell me which one seems to come out closer to you – top, bottom, right or left.	1	Bottom	800	☐
	2	Left	400	☐
	3	Bottom	200	☐
	4	Top	140	☐
	5	Top	100	☐
	6	Left	80	☐
	7	Right	60	☐
	8	Left	50	☐
	9	Right	40	☐

STEREOPTEST – ANIMALS

READ: Does one of these animals seem to come out closer to you than the others?	A	Cat	400	☐
	B	Rabbit	200	☐
	C	Monkey	100	☐
Angle (seconds)	☐☐☐☐			

VISUAL ACUITY

LEFT EYE

READ: Please cover your right eye and read the letters on the chart with your left eye.

1	R	
2	D K	
3	C H V	
4	O Z N S	
5	C H R N S	
6	Z R K V D H	
7	V H D S N K O Z C	_____
8	S N K H O Z C V R D	
9	R Z O H K V D K S N	
10	V S H R K D N O Z C	
12	Z O N O K R V D S	
15	C K R Z O D S N V	

RIGHT EYE

READ: Please cover your left eye and read the letters on the chart with your right eye.

1	R	
2	D K	
3	C H V	
4	O Z N S	
5	C H R N S	
6	Z R K V D H	
7	V H D S N K O Z C	_____
8	S N K H O Z C V R D	
9	R Z O H K V D K S N	
10	V S H R K D N O Z C	
12	Z O N O K R V D S	
15	C K R Z O D S N V	

BOTH EYES

READ: Please read the letters on the chart with your both eyes.

1	R	
2	D K	
3	C H V	
4	O Z N S	
5	C H R N S	
6	Z R K V D H	
7	V H D S N K O Z C	_____
8	S N K H O Z C V R D	
9	R Z O H K V D K S N	
10	V S H R K D N O Z C	
12	Z O N O K R V D S	
15	C K R Z O D S N V	

Pelli-Robson Contrast Sensitivity Test

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

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Pelli-Robson Contrast Sensitivity Test

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

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2.☐☐☐

THÔNG TIN NỀN					
K1	Ngày phỏng vấn lần 2	☐☐.☐☐.☐☐☐☐			
K2	Bác đã được phẫu thuật	Một mắt	1		☐
		Hai mắt	2	→ A1	
		Chưa phẫu thuật mắt nào	3	→ K5	
K3	Bác đã phẫu thuật mắt nào?	Mắt trái	1		☐
		Mắt phải	2		
K4	Tại sao bác chưa được phẫu thuật mắt thứ hai?	*Sau khi trả lời → A1*			
K5	Tại sao bác chưa được phẫu thuật cả hai mắt?	*Sau khi trả lời → dừng phỏng vấn*			

2.□□□

THÔNG TIN CHUNG					
Trước tiên, cháu xin hỏi Bác một số thông tin chung về bản thân Bác					
A1	Tình trạng hôn nhân của Bác?	Độc thân	1		□
		Kết hôn/sống như vợ chồng	2		
		Góa	3		
		Ly dị/ly thân	4		
A2	Hiện tại Bác đang sống với những ai? (CÂU HỎI NHIỀU LỰA CHỌN)	Một mình	1	→ A4	□
			2		
		Chồng/vợ	1		□
			2		
		Con/dâu/rể	1		□
			2		
		Khác (ghi rõ)	1		□
			2		
A3	Hiện tại có bao nhiêu người sống chung nhà với bác?	Người □□			
A4	Bằng cấp cao nhất của Bác?	Không đi học	1		□
		Biết đọc/biết viết	2		
		Cấp 1	3		
		Cấp 2	4		
		Cấp 3	5		
		Trường nghề	6		
		Đại học	7		
A5	Hiện nay bác đang làm nghề gì?	Hưu/Già/Mất sức lao động	1		□
		Nội trợ	2		
		Kinh doanh/buôn bán	3		
		Nhân viên văn phòng	4		
		Công nhân	5		
		Chạy xe ôm	6		
		Tài xế (taxi, xe tải, ...)	7		
		Nghề tự do (thợ hồ, làm thuê, làm nông, ...)	8		
		Khác (ghi rõ)	9		
A6	Trung bình một tháng, gia đình của bác thu nhập bao nhiêu? (TRIỆU)	□□□.□			
A7	Bác là người dân tộc gì?	Kinh	1		□
		Hoa	2		
		Khơme	3		
		Khác (ghi rõ)	4		
A8	Bác theo đạo gì?	Không theo đạo	1		□
		Phật	2		
		Thiên Chúa	3		
		Khác (ghi rõ)	4		

2.□□□

TÌNH TRẠNG BỆNH TẬT					
B1	Hiện tại Bác có đang sử dụng bất kỳ toa thuốc nào do Bác sĩ kê toa không?	Có	1		□
		Không	2	→ B3	
B2	Xin bác hãy kể tên các loại thuốc đang dùng				
B3	Hiện tại Bác có đang sử dụng bất kỳ toa thuốc nào mà không do Bác sĩ kê toa không?	Có	1		□
		Không	2	→ B5	
B4	Xin bác hãy kể tên các loại thuốc đang dùng				
ĐỌC: Hiện tại bác có nghe bác sĩ nói bác bị những bệnh sau đây hay không?					
B5	Ung thư	Có	1		□
		Không	2		
B6	Tim mạch	Có	1		□
		Không	2		
B7	Chứng đau thắt ngực	Có	1		□
		Không	2		
B8	Đột quỵ (tai biến)	Có	1		□
		Không	2		
B9	Cao huyết áp	Có	1		□
		Không	2		
B10	Viêm khớp dạng thấp	Có	1		□
		Không	2		
B11	Viêm khớp mãn tính	Có	1		□
		Không	2		
B12	Bệnh thận	Có	1		□
		Không	2		
B13	Động kinh	Có	1		□
		Không	2		
B14	Tổn thương thính lực	Có	1		□
		Không	2		
B15	Hội chứng ngưng thở lúc ngủ	Có	1		□
		Không	2		
B16	Suyễn	Có	1		□
		Không	2		
B17	Máu nhiễm mỡ, rối loạn lipid máu	Có	1		□
		Không	2		
B18	Lạm dụng hay nghiện rượu	Có	1		□
		Không	2		
B19	Khác (ghi rõ)				

2.☐☐☐

TÉ NGÃ VÀ CHẤN THƯƠNG									
ĐỌC: Cháu sẽ hỏi Bác vài câu hỏi về tình trạng té ngã và chấn thương của Bác sau khi mổ mắt.									
F1	**<u>Kể từ ngày được phẫu thuật đục thủy tinh thể,</u>** Bác có bị té hay ngã trên sàn hoặc nền đất hay không? *Té ngã được xem "như là tình trạng bệnh nhân nằm xuống sàng, mặt đất hoặc những nơi có độ cao thấp hơn một cách không chủ ý".*					Có	1		☐
						Không	2	→ *F3*	
F2	**<u>Nếu có</u>**, Bác bị té ngã bao nhiêu lần?								☐☐
Đối với mỗi lần ngã, Bác có cần nhập viện hay chăm sóc y tế không									
	Lần	Cần nhập viện		Cần chăm sóc y tế		Nguyên nhân té ngã	Vị trí chấn thương	Bác làm gì khi bị té ngã	
		Có	Không	Có	Không				
F2a	1	☐	☐	☐	☐				
F2b	2	☐	☐	☐	☐				
F2c	3	☐	☐	☐	☐				
F2d	4	☐	☐	☐	☐				
F2e	5	☐	☐	☐	☐				
F3	**<u>Kể từ ngày được phẫu thuật đục thủy tinh thể,</u>** Bác có bị chấn thương nào mà không do té ngã gây ra hay không (ví dụ như bỏng, gãy xương, bầm, xước, bông gân,...)?					Có	1		☐
						Không	2	→ *M1*	
F4	**<u>Nếu có</u>**, Bác đã bị chấn thương bao nhiêu lần?								☐☐
Đối với mỗi chấn thương, Bác có cần nhập viện hay chăm sóc y tế không									
	Lần	Cần nhập viện		Cần chăm sóc y tế		Nguyên nhân chấn thương	Vị trí chấn thương	Bác làm gì khi bị chấn thương	
		Có	Không	Có	Không				
F4a	1	☐	☐	☐	☐				
F4b	2	☐	☐	☐	☐				
F4c	3	☐	☐	☐	☐				
F4d	4	☐	☐	☐	☐				
F4e	5	☐	☐	☐	☐				

2.□□□

TRẦM CẢM						
ĐỌC: Kế tiếp là danh mục những điều mà Bác cảm thấy hay cư xử. Xin Bác hãy cho biết bác đã cảm thấy hay đã làm những điều này bao nhiêu ngày trong tuần vừa qua.						
Trong tuần vừa qua, có bao nhiêu ngày		**< 1 ngày**	**1-2 ngày**	**3-4 ngày**	**5-7 ngày**	
M1	Bác bực mình vì những việc mà trước đây không làm bác bực	0	1	2	3	☐
M2	Bác ăn không ngon miệng hay không cảm thấy thích ăn	0	1	2	3	☐
M3	Bác cảm thấy bác không thể quên đi những nỗi buồn dù đã được gia đình hoặc bạn bè an ủi	0	1	2	3	☐
M4	Bác cảm thấy bác cũng bình thường như những người khác	0	1	2	3	☐
M5	Bác gặp khó khăn khi ghi nhớ những việc bác đang làm	0	1	2	3	☐
M6	Bác cảm thấy bị trầm cảm	0	1	2	3	☐
M7	Bác cảm thấy bác phải nỗ lực để làm những việc bác muốn làm	0	1	2	3	☐
M8	Bác cảm thấy hy vọng về tương lai	0	1	2	3	☐
M9	Bác cảm thấy đời mình là một thất bại	0	1	2	3	☐
M10	Bác cảm thấy sợ hãi	0	1	2	3	☐
M11	Bác ngủ không ngon giấc	0	1	2	3	☐
M12	Bác cảm thấy vui vẻ	0	1	2	3	☐
M13	Bác nói chuyện ít hơn bình thường	0	1	2	3	☐
M14	Bác cảm thấy cô đơn	0	1	2	3	☐
M15	Bác cảm thấy mọi người không thân thiện với bác	0	1	2	3	☐
M16	Bác yêu thích cuộc sống	0	1	2	3	☐
M17	Bác luôn muốn khóc	0	1	2	3	☐
M18	Bác cảm thấy buồn	0	1	2	3	☐
M19	Bác cảm thấy mọi người không thích bác	0	1	2	3	☐
M20	Bác không thể "ra khỏi giường khi thức giấc"	0	1	2	3	☐

2.☐☐☐

CÁC CÂU HỎI VỀ CHỨC NĂNG THỊ LỰC					
PHẦN 1: SỨC KHỎE TỔNG QUÁT VÀ THỊ LỰC					
ĐỌC: Cháu sẽ hỏi bác về chất lượng sống liên quan tới thị lực của bác					
V1	Nhìn chung, bác nghĩ rằng sức khỏe mình đạt loại nào? (ĐỌC CÂU TRẢ LỜI)	Tuyệt vời	1		☐
		Rất tốt	2		
		Tốt	3		
		Bình thường	4		
		Kém	5		
V1a	Bác có đeo kính hay kính áp tròng không?	Có	1		☐
		Không	2		
V2	Hiện tại, thị lực của **<u>cả 2 mắt</u>** của bác (nếu bác có đeo kính hoặc kính áp tròng, xin hãy trả lời như khi bác đeo chúng) là tuyệt vời, rất tốt, tốt, trung bình, kém, hay hoàn toàn không thấy gì? (ĐỌC CÂU TRẢ LỜI)	Tuyệt vời	1		☐
		Tốt	2		
		Trung bình	3		
		Kém	4		
		Rất kém	5		
		Hoàn toàn không thấy gì	6		
V3	Bác có thường xuyên lo lắng về thị lực của mình không? (ĐỌC CÂU TRẢ LỜI)	Không bao giờ	1		☐
		Rất hiếm khi	2		
		Đôi khi	3		
		Thường lo lắng	4		
		Luôn luôn lo lắng	5		
V4	Mắt bác bị đau hay khó chịu (ví dụ như nóng, ngứa, rát hay đau) đến mức nào? Bác sẽ nói: (ĐỌC CÂU TRẢ LỜI)	Không	1		☐
		Nhẹ	2		
		Vừa phải	3		
		Nặng	4		
		Rất nặng	5		
PHẦN 2: KHÓ KHĂN KHI HOẠT ĐỘNG					
ĐỌC: Những câu hỏi tiếp theo là hỏi về những khó khăn mà bác có thể gặp phải, nếu Bác có đeo kính hay kính áp tròng thì hãy trả lời như khi bác đeo kính hay kính áp tròng cho những hoạt động dưới đây.					
V5	Bác có gặp khó khăn gì khi đọc báo với cỡ chữ bình thường hay không? Bác sẽ nói: (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V6	Bác có gặp khó khăn gì khi làm việc hay vui chơi mà cần phải thấy rõ ở cự ly gần như nấu nướng, may vá, sửa chữa các vật dụng trong nhà, hay dùng các dụng cụ cầm tay? Bác sẽ nói: (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V7	Do thị lực của Bác, Bác có cảm thấy khó khăn gì khi tìm các đồ vật ở trên kệ có nhiều vật dụng không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		

2.☐☐☐

V8	Bác có gặp khó khăn gì khi xem các biển báo giao thông hay tên của các cửa hàng hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V9	Do thị lực của Bác, Bác có cảm thấy khó khăn gì khi đi xuống cầu thang, thềm nhà, hay bậc cửa lúc trời tối hoặc thiếu ánh sáng hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V10	Do thị lực của Bác, Bác có cảm thấy khó khăn gì khi chú ý tới những vật nằm xa về phía Bác đang đi hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V11	Do thị lực của Bác, Bác có gặp khó khăn gì khi nhìn những người khác phản ứng lại những gì Bác nói hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V12	Do thị lực của Bác, Bác có gặp khó khăn gì khi chọn và lấy quần áo hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V13	Do thị lực của Bác, Bác có gặp khó khăn gì khi đến thăm người khác tại nhà của họ hoặc khi đi dự tiệc hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V14	Do thị lực của Bác, Bác có gặp khó khăn gì khi đi xem phim, kịch, hay các trận thi đấu thể thao hay không? (ĐỌC CÂU TRẢ LỜI NẾU CẦN THIẾT)	Không khó khăn	1		☐
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		

PHẦN 3: ĐỤC THỦY TINH THỂ VÀ KHÓ KHĂN KHI CHẠY XE					
ĐỌC: Bây giờ, cháu sẽ hỏi Bác một số câu hỏi về việc chạy xe của Bác					
V15	Hiện tại, thỉnh thoảng bác có chạy xe không?	Có	1	→ *V15c*	□
		Không	2		
V15a	Nếu KHÔNG, HỎI: Bác chưa bao giờ chạy xe hay bác không còn chạy xe nữa?	Chưa bao giờ chạy	1	→ *V17*	□
		Không còn chạy nữa	2		
V15b	NẾU BÁC KHÔNG CÒN CHẠY XE NỮA, lý do chính là do thị lực của bác hay do nguyên nhân nào khác?	Thị lực	1	→ *V17*	□
		Lý do khác (ghi rõ)	2		
		Cả thị lực và lý do khác	3		
V15c	NẾU BÁC ĐANG CHẠY XE: Bác có gặp khó khăn gì khi chạy xe vào ban ngày tại những địa điểm quen thuộc hay không?	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
V16	Bác có gặp khó khăn gì khi chạy xe ban đêm hay không?	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
V16a	Bác có gặp khó khăn gì khi chạy xe trong những điều kiện khó khăn như thời tiết xấu, giờ cao điểm, đường đông xe, hay đường cao tốc không?	Không khó khăn	1		□
		Một chút khó khăn	2		
		Nhiều khó khăn	3		
		Rất khó khăn	4		
		Ngừng làm do thị lực	5		
		Ngừng làm do lý do khác hoặc không thích làm	6		
PHẦN 4: CÁC THÔNG TIN BỔ SUNG					
V16b	Bác chạy xe gì? (CÂU HỎI NHIỀU LỰA CHỌN)	Xe đạp	1		□
			2		
		Xe máy	1		□
			2		
		Xe hơi	1		□
			2		
		Khác (ghi rõ)	1		□
			2		
V16c	Trong một tuần, trung bình bác chạy xe mấy lần?	Lần/tuần □□□			
V16d	Trong một tuần, trung bình bác chạy xe bao nhiêu km?	Km/tuần □□□□			
V16e	Trong 12 tháng qua, khi đang chạy xe Bác bị va chạm bao nhiêu lần? *(Xin hãy kể những vụ va chạm với xe, chướng ngại vật, động vật và cả khi bị lật xe. Xin hãy cho biết tổng số vụ tai nạn dù do lỗi của Bác hay người khác)*	Số vụ □□			

2.□□□

PHẦN 5: ĐÁP ỨNG VỚI NHỮNG VẤN ĐỀ THỊ LỰC

ĐỌC: Những câu hỏi tiếp theo là hỏi về những việc mà có thể ảnh hưởng đến thị lực của Bác. Đối với từng việc, Bác có thể cho cháu biết thực tế *"lúc nào cũng xảy ra", "thường xuyên xảy ra", "đôi khi xảy ra", "ít khi xảy ra", hay "chưa bao giờ xảy ra".*

		Lúc nào cũng xảy ra	Thường xảy ra	Đôi khi xảy ra	Ít khi xảy ra	Chưa bao giờ xảy ra	
V17	Do thị lực của Bác, nên Bác ít đạt được những gì Bác muốn?	1	2	3	4	5	☐
V18	Do thị lực của Bác nên Bác làm việc và sinh hoạt ít hơn bình thường?	1	2	3	4	5	☐
V19	Mắt của Bác có thường xuyên bị đau hay khó chịu không, ví dụ như bỏng/rát, thốn, đau làm cho bác không thể làm được những việc bác muốn làm?	1	2	3	4	5	☐

ĐỌC: Đối với những câu sau đây, Bác hãy cho tôi biết nếu *"đúng hoàn toàn", "đúng một phần", "không chắc", "hơi sai", hay "hoàn toàn sai"* với tình trạng của Bác hiện nay.

		Đúng hoàn toàn	Gần đúng	Không chắc	Hơi sai	Hoàn toàn sai	
V20	Bác ở nhà hầu hết thời gian do thị lực của bác	1	2	3	4	5	☐
V21	Bác cảm thấy rất nản do thị lực của bác	1	2	3	4	5	☐
V22	Bác ít khi kiểm soát được việc bác làm do thị lực của bác	1	2	3	4	5	☐
V23	Do thị lực của bác, bác phải lệ thuộc quá nhiều vào những gì mà người khác bảo bác làm	1	2	3	4	5	☐
V24	Bác cần rất nhiều sự giúp đỡ từ người khác do thị lực của bác	1	2	3	4	5	☐
V25	Bác sợ bác làm những việc ảnh hưởng xấu tới bản thân và người khác do thị lực của bác	1	2	3	4	5	☐

2.☐☐☐

STEREOPSIS

ĐỌC: Bác hãy ngồi thẳng và giữ hình trước mặt bác cách mắt khoảng 40,6 cm. Nếu bác có **đeo kính** khi đọc sách xin bác hãy đeo kính vào.

STEREO FLY TEST

	Seconds	Đúng
Bệnh nhân **KHÔNG** thấy hình ảnh 3 chiều của cánh ruồi	> 3.552	☐
Bệnh nhân thấy hình ảnh 3 chiều của cánh ruồi	3.552	☐

STEREOPTEST – CIRCLES

ĐỌC: Bắt đầu với hình số 1, bác hãy nhìn vào bốn hình tròn phía trên, dưới, trái, phải và cho biết hình tròn nào đang nhô lên về phía bác?	1	Dưới	800	☐
	2	Trái	400	☐
	3	Dưới	200	☐
	4	Trên	140	☐
	5	Trên	100	☐
	6	Trái	80	☐
	7	Phải	60	☐
	8	Trái	50	☐
	9	Phải	40	☐

STEREOPTEST – ANIMALS

ĐỌC: Bác hãy nhìn vào hình A và cho biết con vật nào đang nhô lên về phía bác.	A	Mèo	400	☐
	B	Thỏ	200	☐
	C	Khỉ	100	☐
Góc nhìn (seconds)				☐☐☐☐

ĐO THỊ LỰC

MẮT TRÁI

ĐỌC: Bây giờ bác hãy che mắt phải lại và dùng mắt trái để đọc các chữ cái trên bảng.	1	R	————
	2	D K	
	3	C H V	
	4	O Z N S	
	5	C H R N S	
	6	Z R K V D H	
	7	V H D S N K O Z C	
	8	S N K H O Z C V R D	
	9	R Z O H K V D K S N	
	10	V S H R K D N O Z C	
	12	Z O N O K R V D S	
	15	C K R Z O D S N V	

MẮT PHẢI

ĐỌC: Bây giờ bác hãy che mắt trái lại và dùng mắt phải để đọc các chữ cái trên bảng	1	R	————
	2	D K	
	3	C H V	
	4	O Z N S	
	5	C H R N S	
	6	Z R K V D H	
	7	V H D S N K O Z C	
	8	S N K H O Z C V R D	
	9	R Z O H K V D K S N	
	10	V S H R K D N O Z C	
	12	Z O N O K R V D S	
	15	C K R Z O D S N V	

HAI MẮT

ĐỌC: Bây giờ bác hãy dùng hai mắt để đọc các chữ cái trên bảng.	1	R	————
	2	D K	
	3	C H V	
	4	O Z N S	
	5	C H R N S	
	6	Z R K V D H	
	7	V H D S N K O Z C	
	8	S N K H O Z C V R D	
	9	R Z O H K V D K S N	
	10	V S H R K D N O Z C	
	12	Z O N O K R V D S	
	15	C K R Z O D S N V	

Pelli-Robson Contrast Sensitivity Test

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	V R S	K D R	0.15
0.30	N H C	S O K	0.45
0.60	S C N	O Z V	0.75
0.90	C N H	Z O K	1.05
1.20	N O D	V H R	1.35
1.50	C D N	Z S V	1.65
1.80	K C H	O D K	1.95
2.10	R S Z	H V R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

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Pelli-Robson Contrast Sensitivity Test

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Right Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Binocular

Log Contrast Sensitivity: _____

Acuity: _____

0.00	H S Z	D S N	0.15
0.30	C K R	Z V R	0.45
0.60	N D C	O S K	0.75
0.90	O Z K	V H Z	1.05
1.20	N H O	N R D	1.35
1.50	V R C	O V H	1.65
1.80	C D S	N D C	1.95
2.10	K V Z	O H R	2.25

Left Eye

Log Contrast Sensitivity: _____

Acuity: _____

Correction: _____

Pupil Diameter: _____ mm

Name: _____

Age, Sex: _____

Diagnosis: _____

Medications: _____

Date: _____

Examiner: _____

Comments: _____

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Appendix 6: Questionnaire for the third interview

3.☐☐☐

GENERAL INFORMATION					
G1	Date of third interview	☐☐.☐☐.☐☐			
G2	Did you have second-eye cataract surgery done?	Yes	1		☐
		No	2	→ G4	
G3	What was the date of second-eye surgery?	☐☐.☐☐.☐☐ → F1			
G4	Why did you not have second-eye cataract surgery done?				

FALLS AND OTHER INJURIES					
READ: We are going to ask you some questions about your fall and injury status, please think about your situation after your cataract surgery.					
F1	**After your cataract surgery,** have you fallen and landed on the floor or ground? *A fall will be defined "as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level"*	Yes	1		☐
		No	2	→ F3	
F2	**If yes,** how many times have you fallen?	☐☐			

For each fall, did you require hospitalisation or other medical attention

	Fall number	Require hospitalisation		Required medical attention		Cause of fall	Injurious position	What were you doing at the time of fall
		Yes	No	Yes	No			
F2a	1	☐	☐	☐	☐			
F2b	2	☐	☐	☐	☐			
F2c	3	☐	☐	☐	☐			
F2d	4	☐	☐	☐	☐			
F2e	5	☐	☐	☐	☐			

F3	**After your cataract surgery,** did you have any other injuries that were not related to fall (for example burn, fracture, contusion, sprain, lacerations, etc...)?	Yes	1		☐
		No	2	→ end	
F4	**If yes,** how many other injuries did you have?	☐☐			

For each injury, did you require hospitalisation or other medical attention

	Injury number	Require hospitalisation		Required medical attention		Cause of injury	Injurious position	What were you doing at the time of injury
		Yes	No	Yes	No			
F4a	1	☐	☐	☐	☐			
F4b	2	☐	☐	☐	☐			
F4c	3	☐	☐	☐	☐			
F4d	4	☐	☐	☐	☐			
F4e	5	☐	☐	☐	☐			

3.☐☐☐

THÔNG TIN CHUNG					
G1	Ngày phỏng vấn lần 3	☐☐.☐☐.☐☐			
G2	Bác đã được phẫu thuật mắt thứ hai chưa?	Rồi	1		☐
		Chưa	2	→ G4	
G3	Ngày mổ mắt hai?	☐☐.☐☐.☐☐ → F1			
G4	Tại sao bác chưa phẫu thuật mắt thứ hai?				

TÉ NGÃ VÀ CHẤN THƯƠNG					
ĐỌC: Cháu sẽ hỏi Bác vài câu hỏi về tình trạng té ngã và chấn thương của Bác sau khi mổ mắt.					
F1	**Kể từ ngày được phẫu thuật đục thủy tinh thể,** Bác có bị té hay ngã trên sàn hoặc nền đất hay không? *Té ngã được xem "như là tình trạng bệnh nhân nằm xuống sàng, mặt đất hoặc những nơi có độ cao thấp hơn một cách không chủ ý".*	Có	1		☐
		Không	2	→ *F3*	
F2	**Nếu có**, Bác bị té ngã bao nhiêu lần?	☐☐			

Đối với mỗi lần ngã, Bác có cần nhập viện hay chăm sóc y tế không

	Lần	Cần nhập viện		Cần chăm sóc y tế		Nguyên nhân té ngã	Vị trí chấn thương	Bác làm gì khi bị té ngã
		Có	Không	Có	Không			
F2a	1	☐	☐	☐	☐			
F2b	2	☐	☐	☐	☐			
F2c	3	☐	☐	☐	☐			
F2d	4	☐	☐	☐	☐			
F2e	5	☐	☐	☐	☐			

F3	**Kể từ ngày được phẫu thuật đục thủy tinh thể,** Bác có bị chấn thương nào mà không do té ngã gây ra hay không (ví dụ như bỏng, gãy xương, bầm, xước, bông gân,...)?	Có	1		☐
		Không	2	→ *kết thúc*	
F4	**Nếu có,** Bác đã bị chấn thương bao nhiêu lần?	☐☐			

Đối với mỗi chấn thương, Bác có cần nhập viện hay chăm sóc y tế không

	Lần	Cần nhập viện		Cần chăm sóc y tế		Nguyên nhân chấn thương	Vị trí chấn thương	Bác làm gì khi bị chấn thương
		Có	Không	Có	Không			
F4a	1	☐	☐	☐	☐			
F4b	2	☐	☐	☐	☐			
F4c	3	☐	☐	☐	☐			
F4d	4	☐	☐	☐	☐			
F4e	5	☐	☐	☐	☐			

Appendix 7: Ethics approval

Curtin University

Memorandum

To	A/Prof Lynn Meuleners, Public Health
From	A/Professor Stephan Millett, Chair, Human Research Ethics Committee
Subject	Protocol Approval **HR 68/2011**
Date	28 July 2011
Copy	Mr To Gia Kien Public Health Prof Andy Lee Public Health

Office of Research and Development

Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for providing the additional information for the project titled "*Impact of bilateral cataract surgery on quality of life, depression, falls and other injuries: A prospective study in Vietnam".* The information you have provided has satisfactorily addressed the queries raised by the Committee. Your application is now **approved**.

- You have ethics clearance to undertake the research as stated in your proposal.
- The approval number for your project is **HR 68/2011.** *Please quote this number in any future correspondence*.
- Approval of this project is for a period of twelve months **28-07-2011** to **28-07-2012**. To renew this approval a completed Form B (attached) must be submitted before the expiry date **28-07-2012**.
- If you are a Higher Degree by Research student, data collection must not begin before your Application for Candidacy is approved by your Faculty Graduate Studies Committee.
- The following standard statement **must be** included in the information sheet to participants:

  This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 68/2011). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Applicants should note the following:

It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached **FORM B** should be completed and returned to the Secretary, HREC, C/- Office of Research & Development:
When the project has finished, or

- If at any time during the twelve months changes/amendments occur, or
- If a serious or unexpected adverse event occurs, or
- 14 days prior to the expiry date if renewal is required.
- An application for renewal may be made with a Form B three years running, after which a new application form (Form A), providing comprehensive details, must be submitted.

Regards,

A/Professor Stephan Millett
Chair Human Research Ethics Committee

Appendix 8: Written statements of contribution

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.
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- To KG, Meuleners LB, Fraser ML, Do DV, Duong DV, Huynh VA, To QG, Phi TD, Tran HH, Nguyen ND. The impact of cataract surgery on vision-related quality of life for bilateral cataract patients in Ho Chi Minh City, Vietnam: a prospective study. Health and Quality of Life Outcomes. 2014; 12(1):16.
- To KG, Meuleners LB, Fraser ML, Van Duong D, Van Do D, Huynh VA, Phi TD, Tran HH, Nguyen ND. The impact of cataract surgery on depressive symptoms for bilateral cataract patients in Ho Chi Minh City, Vietnam. International Psychogeriatrics. 2014; 26(2):307-13.
- To KG, Meuleners L, Bulsara M, Fraser ML, Duong DV, Do DV, Huynh VA, Phi TD, Tran HH, Nguyen ND. A longitudinal cohort study of the impact of first and both-eye cataract surgery on falls and other injuries in Vietnam. Clinical Interventions in Aging. 2014; 9:743-51.

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Lynn Meuleners, Prof. (Supervisor)

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publication entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Andy Lee, Prof.

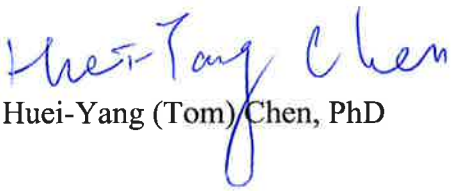
To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publication entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.



Huei-Yang (Tom) Chen, PhD

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners LB, Fraser ML, Do DV, Duong DV, Huynh V-AN, To QG, Phi TD, Tran HH, Nguyen ND. Prevalence and Visual Risk Factors for Falls in Bilateral Cataract Patients in Ho Chi Minh City, Vietnam. Ophthalmic Epidemiology. 2014; 21(2):79-85.
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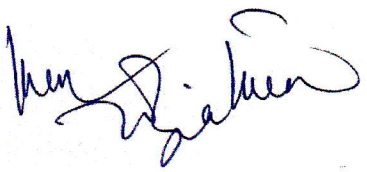

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Michelle Fraser

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publication entitled:

- To KG, Meuleners L, Bulsara M, Fraser ML, Duong DV, Do DV, Huynh VA, Phi TD, Tran HH, Nguyen ND. A longitudinal cohort study of the impact of first and both-eye cataract surgery on falls and other injuries in Vietnam. Clinical Interventions in Aging. 2014; 9:743-51.

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Max Bulsara, Prof.

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.
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- To KG, Meuleners LB, Fraser ML, Van Duong D, Van Do D, Huynh VA, Phi TD, Tran HH, Nguyen ND. The impact of cataract surgery on depressive symptoms for bilateral cataract patients in Ho Chi Minh City, Vietnam. International Psychogeriatrics. 2014; 26(2):307-13.
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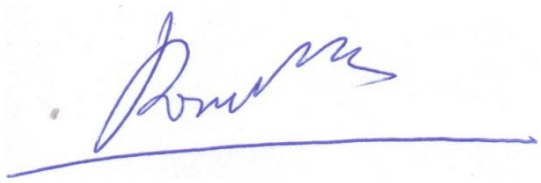
To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.



Do Van Dung, A/Prof.

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.
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To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Duong Van Dat, PhD

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners LB, Fraser ML, Do DV, Duong DV, Huynh V-AN, To QG, Phi TD, Tran HH, Nguyen ND. Prevalence and Visual Risk Factors for Falls in Bilateral Cataract Patients in Ho Chi Minh City, Vietnam. Ophthalmic Epidemiology. 2014; 21(2):79-85.
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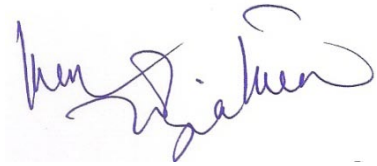

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Huynh Ngoc Van Anh

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners LB, Fraser ML, Do DV, Duong DV, Huynh V-AN, To QG, Phi TD, Tran HH, Nguyen ND. Prevalence and Visual Risk Factors for Falls in Bilateral Cataract Patients in Ho Chi Minh City, Vietnam. Ophthalmic Epidemiology. 2014; 21(2):79-85.
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To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

To Gia Quyen

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.
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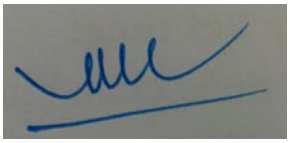
To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.



Phi Duy Tien, MD

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.
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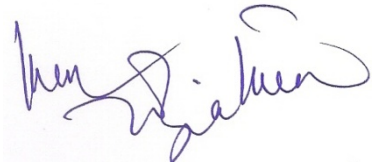

To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.

Tran Huy Hoang, MD.

To Whom It May Concern

I, To Gia Kien, contributed to conception and design, data collection, analysis and interpretation of research data, drafting and revising of the following publications entitled:

- To KG, Meuleners L, Chen HY, Lee A, Van Do D, Van Duong D, Phi TD, Tran HH, Nguyen ND. Assessing the test-retest repeatability of the Vietnamese version of the National Eye Institute 25-item Visual Function Questionnaire among bilateral cataract patients for a Vietnamese population. Australasian Journal on Ageing. 2014; 33(2):E7-E10.
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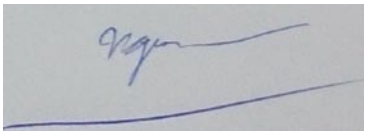
To Gia Kien, PhD student

I, as a Co-Author, endorse that this level of contribution by the candidate indicated above is appropriate.



Nguyen Do Nguyen, MD.